VOLUME 19 / NUMBER 14
JULY 23, 1981
ACC. NOS. N81-23008 TO N81-24018

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
BRANCH

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C., 20402, United States of America.

Semimonthly issues...

Annual subscription rates: $80.00 domestic; $100.00 foreign. Price per single copy: $4.25 domestic; $5.35 foreign.

Cumulative index issues, semiannual and annual ...

Annual subscription rates for both: $25.00 domestic; $31.25 foreign. Price per single copy: semiannual $9.50 domestic, $11.90 foreign; annual $16.00 domestic, $20.00 foreign.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, Belize, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION BRANCH
Scientific and Technical Aerospace Reports, Volume 19, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by PRC Data Services Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1981.

US ISSN 0036-8741

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Objectives and Plans (RTOPs)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

SUBJECT SCOPE

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

OTHER NASA PUBLICATIONS

Other NASA publications and information services are described in the publication, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

HOW TO USE STAR SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

DOCUMENTS ON MICROFICHE

Documents on microfiche[1] are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.50 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02 ($5.00 domestic; $10.00 foreign). Microfiche are sold at price code A01 ($3.50 domestic; $7.00 foreign). The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;

2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 8757
B.W.I. Airport, Maryland 21240

Organizations abroad should direct requests to the same address, but to the attention of: International Exchange Program.

AVAILABILITY OF STAR ABSTRACTS ON MICROFICHE

Microfiche of the abstract sections of this issue ahd other issues of *STAR* are available on annual subscription from NTIS, Attn: Subscriptions, 5285 Port Royal Road, Springfield, Virginia 22161. Annual subscription rates are $45.00 North America; $90.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates. Microfiche for individual *STAR* issue abstract sections are not available.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, New York 10019

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and
Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Fachinformationszentrum Energie, Physik,
Mathematik GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Branch (NST-41)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Schedule A

STANDARD PAPER COPY PRICE SCHEDULE

(Effective January 1, 1981)

Price Code	Page Range	North American Price	Foreign Price
A01	Microfiche	$ 3.50	$ 7.00
A02	001-025	5.00	10.00
A03	026-050	6.50	13.00
A04	051-075	8.00	16.00
A05	076-100	9.50	19.00
A06	101-125	11.00	22.00
A07	126-150	12.50	25.00
A08	151-175	14.00	28.00
A09	176-200	15.50	31.00
A10	201-225	17.00	34.00
A11	226-250	18.50	37.00
A12	251-275	20.00	40.00
A13	276-300	21.50	43.00
A14	301-325	23.00	46.00
A15	326-350	24.50	49.00
A16	351-375	26.00	52.00
A17	376-400	27.50	55.00
A18	401-425	29.00	58.00
A19	426-450	30.50	61.00
A20	451-475	32.00	64.00
A21	476-500	33.50	67.00
A22	501-525	35.00	70.00
A23	526-550	36.50	73.00
A24	551-575	38.00	76.00
A25	576-600	39.50	79.00
	601-up	-- 1/	-- 2/

A99 - Write for quote

1/ Add $1.50 for each additional 25 page increment or portion thereof for 601 pages up.

2/ Add $3.00 for each additional 25 page increment or portion thereof for 601 pages and more.

Schedule E

EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

Price Code	North American Price	Foreign Price
E01	$ 5.50	$ 11.50
E02	6.50	13.50
E03	8.50	17.50
E04	10.50	21.50
E05	12.50	25.50
E06	14.50	29.50
E07	16.50	33.50
E08	18.50	37.50
E09	20.50	41.50
E10	22.50	45.50
E11	24.50	49.50
E12	27.50	55.50
E13	30.50	61.50
E14	33.50	67.50
E15	36.50	73.50
E16	39.50	79.50
E17	42.50	85.50
E18	45.50	91.50
E19	50.50	100.50
E20	60.50	121.50

E99 - Write for quote

N01	28.00	40.00

VOLUME 19 NUMBER 14/JULY 23, 1981

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 1853

02 AERODYNAMICS 1855

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 1859

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 1860

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 1860

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 1863

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 1864

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 1866

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 1866

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 1867

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS N.A.

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 1878

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 1879

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING 1880

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 1880

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION N.A.
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 1880
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 1881
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 1882
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 1882
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 1888
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 1893
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 1896
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 1900
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 1902
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 1909
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 1913
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 1918
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 1920
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 1921
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 1924
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 1925
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 1928

43 EARTH RESOURCES 1933
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 1940
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 1955
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 1959
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 1964
Includes weather forecasting and modification.

48 OCEANOGRAPHY 1967
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 1968
Includes genetics.

52 AEROSPACE MEDICINE 1968
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 1969
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 1969
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) 1971

60 COMPUTER OPERATIONS AND HARDWARE 1971
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 1972
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS N.A.
Includes computer networks.

63 CYBERNETICS 1974
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 1975
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 1976
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 1979
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 1979
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) N.A.
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 1979
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 1980
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 1982
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 1983
Includes light phenomena.

75 PLASMA PHYSICS 1985
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 1988
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 1990
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) 1990
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 1990
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 1991
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 1994
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 1995
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 1995
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 1997
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 1997
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 1997
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 1998
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION N.A.
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

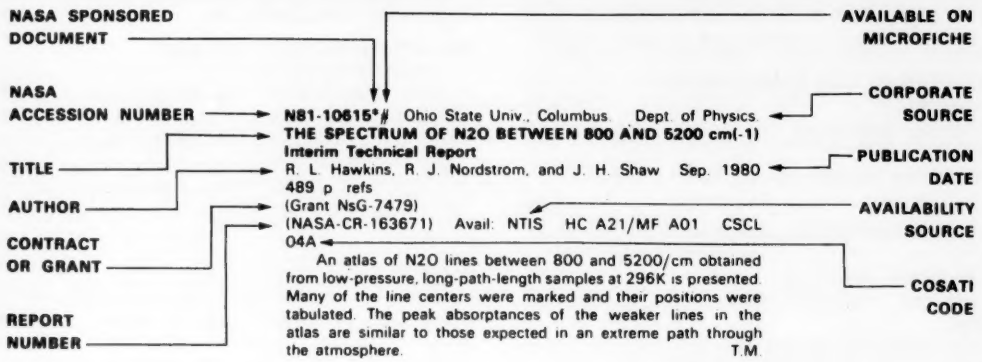
GENERAL

99 GENERAL 1999

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-67
CORPORATE SOURCE INDEX I-75
CONTRACT NUMBER INDEX I-91
REPORT/ACCESSION NUMBER INDEX I-95

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER
N81-10615*# Ohio State Univ., Columbus. Dept. of Physics.
CORPORATE SOURCE
THE SPECTRUM OF N2O BETWEEN 800 AND 5200 cm(-1)
TITLE
Interim Technical Report
PUBLICATION DATE
R. L. Hawkins, R. J. Nordstrom, and J. H. Shaw Sep. 1980
AUTHOR
489 p refs
(Grant NsG-7479)
AVAILABILITY SOURCE
CONTRACT OR GRANT
(NASA-CR-163671) Avail: NTIS HC A21/MF A01 CSCL 04A
COSATI CODE
An atlas of N2O lines between 800 and 5200/cm obtained from low-pressure, long-path-length samples at 296K is presented. Many of the line centers were marked and their positions were tabulated. The peak absorptances of the weaker lines in the atlas are similar to those expected in an extreme path through the atmosphere. T.M.
REPORT NUMBER

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, NUMERICAL STUDY OF LARGE-EDDY BREAK-UP AND ITS EFFECT ON THE DRAG CHARACTERISTICS ON BOUNDARY LAYERS

R.B. Kinney, University of Arizona, School of Engineering, Dept. of Aerospace & Mechanical Engineering, *Tucson, Arizona* 85721 (NAG 1-141)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0002, PREDICTION AND EVALUATION OF THE PRESSURE FLUCTATIONS IN THE B-1 WEAPON BAYS

A.G. Tipton, Rockwell International Corp., *International Airport, Los Angeles, California* (DF143330; F33615-79-C-3208)

Internally carried weapons can be exposed to very intense fluctuating pressures when the weapons bay doors are opened during flight for weapon ejection. The fluctuating pressures have been severe enough to cause damage to the weapons as well as the aircraft structure itself. Current methods used to predict these fluctuating pressures are based almost entirely on wind tunnel data with very little flight data to verify them. They also do not consider the effects of suppression devices. The objective of this effort is to systematically correlate and document the weapons bay data acquired during development of the B-1 aircraft and then verify and/or modify the current prediction methods. The results of this effort will significantly increase the confidence in the prediction methods utilized to determine the fluctuating pressures in aircraft weapon bays with and without suppression devices.

All of the B-1 weapons bay wind tunnel and flight data will be evaluated and correlated. Current empty cavity prediction methods will be verified and/or modified utilizing the correlated results. Prediction methods which account for stores and suppression devices will be developed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0003, RADAR DETECTION ANALYSIS FOR NOE HELICOPTER FLIGHT

P.J. Federico, Science Applications Inc., *1200 Prospect St., P.O. Box 2351, La Jolla, California* 92037 (DA0G0417; DAAK51-79-C-0035)

To conduct an analysis to evaluate the detection and tracking probabilities of three ground-based threat air defense radar systems against the AH-1S and OH-58C helicopters in a nap-of-the-earth (NOE) environment.

The probabilities of radar detection and tracking based on the various helicopter configurations and flight conditions versus the threat radar systems will be computed.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0004, EXTRAPOLATION OF GROUND TEST DATA TO FLIGHT APPLICATIONS

Unknown, Sierracin Corp., Thermal Systems Division, *13920 S. Broadway, Los Angeles, California* 90061 (DF144920; F33615-80-C-3005)

The aerodynamic heating design constraints for high velocity missiles and aircraft are defined through data obtained in facilities which can only partially simulate the environment. This data must be extrapolated to flight conditions for design application. The objective of this effort is to develop techniques for the confident extrapolation of low energy perfect gas wind tunnel data to real gas hypersonic flight environment and to reduce the volume of test data required in ground test of candidate hypersonic systems. This should improve the design confidence and reduce uncertainties which cause weight and performance penalties.

Sophisticated computer simulations of practical hypersonic configurations, while costly, are practical at present. These simulations, in conjunction with more simplified design procedures for real gas flows about equivalent axisymmetric bodies and 'calibrating' data from wind tunnel facilities can lead to confident and cost effective thermal design of lifting reentry vehicles. The approach is to use all of these elements to explore and develop the best and least costly techniques for thermal design of lifting reentry vehicles.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0005, UNSTEADY GAS DYNAMICS PROBLEMS RELATED TO FLIGHT VEHICLES

H. Ashley, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (DF038980; AFOSR-79-0061)

AF function - advanced aerospace vehicles. Opportunity - reduce the limitations in performance and penalties in airframe weight associated with the avoidance of aeroelastic phenomena for many Air Force flight vehicles. Objective - to advance modeling capabilities for unsteady, nonlinear compressible flows, particularly modeling procedures suitable for aeroelastic analysis. In addition, to determine ways for reducing wind tunnel wall interference in unsteady transonic flows. How work contributes - the research will help lay the groundwork necessary for the development of design tools and procedures required to minimize aeroelastic penalties in vehicle performance and airframe weight.

By means of comparative calculations on simple test problems, optimum combinations will be sought of approximate nonlinear partial differential equation, pressure relation, and boundary conditions for unsteady transonic flows. By optimum combinations is meant a combination which provides the greatest accuracy for a broad range of unsteady transonic flows or for a given class of flow (1-D channel flow, 2-D wing flow, flow past isolated bodies, etc.). The influence of wind tunnel boundaries on unsteady airloads will be investigated. For subcritical flow, suitable working forms will be derived for the kernel function of the governing integral equation for the case of wall effects on flow past three-dimensional wings. In the transonic range, approximate means will be sought to achieve wall effect cancellation by using adaptive walls.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

1.0006, RESEARCH INVESTIGATION OF A MINIATURE HYDRAULIC ACTUATOR SYSTEM
D.B. DeBra, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NAG 1-105)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0007, REGENERATIVE ENGINE ANALYSIS
P.G. Schwaar, Avco Corp., Lycoming Division, *550 S. Main St., Stratford, Connecticut* 06497 (DA0G0503; DAAK51-79-C-0056)

The objectives are to identify promising heat exchanger concepts, and to conduct a preliminary design and analysis of a fuel efficient regenerative turboshaft engine suitable for helicopter application.

The effort will be conducted in two phases as follows: a. Engine parametric and heat exchanger design analysis. b. Regenerative engine preliminary design and configuration definition.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0008, PROGRAM OF RESEARCH IN HIGH-SPEED AERODYNAMICS IN THE JOINT INSTITUTE FOR ADVANCEMENT OF FLIGHT SCIENCES
H. Liebowitz, George Washington University, School of Engineering & Applied Sciences, Dept. of Civil Mechanical & Environmental Engineering, *725 23rd St. N.W., Washington, District of Columbia* 20037 (NAG 1-136)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0009, INTEGRATION OF VERY HIGH FREQUENCY OMNI RANGE STATION/DISTANCE MEASURING EQUIPMENT
A.K. Choudhury, Howard University, School of Engineering, Dept. of Electrical Engineering, *2400 6th St. N.W., Washington, District of Columbia* 20001 (NAG 1-130)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0010, DEVELOPMENT OF AN ANALYTICAL TECHNIQUE FOR THE OPTIMIZATION OF JET ENGINE INLET AND DUCT ACOUSTICS LINERS
B.T. Zinn, Georgia Inst. of Technology, School of Aerospace Engineering, *Atlanta, Georgia* 30332 (NAG 1-133)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0011, STABILITY AUGMENTATION SCALING
R.L. Fanin, General Motors Corp., *4700 W. 10th St., Indianapolis, Indiana* 46206 (DF457340; F33615-75-C-2044)

The objective of this effort is to establish the usefulness of local metal matrix composites to increase the vibration stability of fan/compressor blades.

This program consists of five tasks. Task I is a design and analysis effort to parametrically define the influence of locally stiffening turbine engine fan/compressor blades using metal matrix composite inlays. Task II establishes the manufacturing processes to produce a low cost, reproducible blade. Task III includes the fabrication of fan/compressor blading with the composite panel inlays. Task IV emphasizes the verification of frequency, mode shape and strength characteristics using task III hardware. Task V covers the instrumentation, assembly and piggyback engine testing of a full stage of composite inlaid blades. Additional AMST and experimental flight testing is scheduled to structurally verify the Ti metal matrix in the engine environment.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

1.0012, A THEORETICAL INVESTIGATION OF WING ROCKING
C. Lan, University of Kansas, Lawrence Campus, School of Engineering, Dept. of Aerospace Engineering, *Learned Hall, Lawrence, Kansas* 66044 (NAG 1-134)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0013, THEORETICAL AND EXPERIMENTAL STUDIES OF THREE-DIMENSIONAL FLOW INTERFERENCE AND DRAG ON GENERAL AVIATION AIRCRAFT
W.H. Wentz, Wichita State University, School of Engineering, Dept. of Aeronautical Engineering, *1845 Fairmont N., Wichita, Kansas* 67208 (NAG 1-114)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0014, COMBINED APPLICATIONS OF AIRBORNE TRAFFIC SITUATION DISPLAYS TO TERMINAL OPERATIONS
M. Athans, Massachusetts Inst. of Technology, School of Engineering, Dept. of Electrical Engineering & Computer Science, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAG 1-140)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0015, RELIABILITY ISSUES IN ACTIVE CONTROL OF LARGE FLEXIBLE SPACE STRUCTURES
W.E. Vander Velde, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAG 1-126)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0016, ANALYSIS OF SOME ACOUSTICS-JET FLOW INTERACTION PROBLEMS
P. Chow, Wayne State University, School of Liberal Arts, Dept. of Mathematics, *4841 Cass Ave., Detroit, Michigan* 48202 (NAG 1-113)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0017, ASSESSMENT OF THE EFFECT OF NONEQUILIBRIUM IONIZATION ON RADIATIVE TRANSFER DURING OUTER PLANET ATMOSPHERE ENTRY
H.F. Nelson, University of Missouri, Rolla Campus, School of Engineering, Dept. of Aerospace Engineering, *Rolla, Missouri* 65401 (NAG 1-125)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0018, PREDICTION OF STEADY AND UNSTEADY AIRLOADS IN POROUS WALL WIND TUNNELS
J.A. Fromme, University of Nevada, Las Vegas Campus, School of Science & Mathematics, Dept. of Mathematical Sciences, *Las Vegas, Nevada* 89109 (NAG 1-84)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0019, ANALYSIS OF CERT ENVIRONMENTAL TEST TECHNIQUES FOR STORES
P. Hrycak, New Jersey Inst. of Technology, School of Engineering, Dept. of Mechanical Engineering, *323 High St., Newark, New Jersey* 07102 (DF144330; F33615-79-C-3417)

The environmental test conditions under which reliability assessments are made for new externally-carried aircraft equipment systems such as pods, stores, smart bombs, etc., do not realistically reflect the operational conditions in which it must function and live. The lack of realism in reliability testing has

been shown to be a significant contributor to the resultant low reliability of such equipment systems after they are deployed. Realism in testing of externally-carried aircraft equipment systems using conventional simulation techniques has not generally been done because of testing costs. This study is to examine recent advances and formulate new environmental simulation techniques with better cost/realism ratio for development of improved test criteria.

Recent technical literature shall be reviewed to determine advances in state-of-the-art for environmental stress simulation applicable to store systems. Analytical analysis of alternate approaches shall be formulated from basic principles of physics.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0020, CREW STATION DESIGN FACILITY FEASIBILITY STUDY

S. Lacarrubba, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DF141530; F33615-77-C-3067)

This effort will support the development of new display concepts for advanced aerospace crew stations. A USAF pilot opinion survey identifies numerous serious cockpit lighting and display legibility problems which impact day/night mission performance. The increasing numbers of multipurpose light-emitting displays (cathode ray tube displays) used in conjunction with complicated future weapon systems further substantiates the need for definitive display design criteria. The objective of this effort is to determine the feasibility of building a test facility capable of simulating the broad range of extreme illumination conditions experienced in air-to-air combat, air-to-ground weapons delivery, and other critical day/night mission phases. Dynamic lighting simulation capability will permit evaluating cockpit lighting and display legibility from a systems viewpoint within the context of more realistic mission conditions. This capability will also permit formulation of meaningful cockpit lighting and display legibility design criteria.

This effort is the initial phase in the development of a crew station design facility. A feasibility and design study to define trade-offs, technical limitations and overall design of the test facility will be contracted. The study will provide information concerning description, location, type of simulated features (such as air targets, ground targets, flares, and extreme ambient illumination sources) and the simulator enclosure itself. The results of the study will be used in a future detailed design study preliminary to construction of the facility.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0021, INVESTIGATION INTO LOST BENEFITS OF STRESS WAVE RIVETING

B. Leftheris, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN081425; N62269-79-C-0719)

Obtain quantitative data on the potential cost benefits/penalties of using a newly developed fatigue life enhancing stress wave riveting process in comparison to competing fastener systems. This contract supports W.U. ZA601, Aircraft Technology, agency accession DN 681080.

Detailed cost studies will be performed to compare production costs of the stress wave rivet system with those of competing fatigue life enhancing and conventional fastener systems. Cost comparisons will be based on typical usage rates of the various fastener types. A favorable cost outlook for the stress wave system would justify further development work to optimize the process.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0022, DEMONSTRATION OF DIVERGENCE AND FLUTTER PREVENTION FOR FORWARD SWEPT WINGS

K. Wilkinson, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DF142350; F33615-78-C-3223)

Recent feasibility studies indicate that aircraft with forward swept wings show significant improvements in transonic performance when compared to conventional aircraft. Sweeping conventional metal wings forward decreases aeroelastic divergence speed but by using advanced composite materials and incorporating bending-twist coupling in the design, forward swept wings can be divergence- and flutter-free. The objective of this program is to provide correlation between analytical estimates of flutter and divergence speed and wind tunnel tests. The results of this program will be applied to the design and testing of high performance aircraft with swept forward wings.

The program consists of four phases. Phase 1 is the design and analysis of scaled models demonstrating prevention of aeroelastic divergence and flutter of forward swept wings. The model will be representative of a flight demonstrator using advanced composite materials. Phase 2 is fabrication of the wind tunnel models. Phase 3 is model testing and data reduction. Phase 4 is correlation of analysis and test results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0023, TRANSONIC NORMAL SHOCK-LAMINAR BOUNDARY LAYER INTERACTIONS WITH SUCTION

R.B. Ram, State University of New York, College at Oneonta, School of Arts & Sciences, Dept. of Mathematics, *Oneonta, New York* 13820 (NAG 1-131)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0024, AEROACOUSTICS OF A POROUS PLUG JET NOISE SUPPRESSOR

D.S. Dosanjh, Syracuse University, L.C. Smith College of Engineering, Dept. of Mechanical & Aerospace Engineering, *Link Hall, Syracuse, New York* 13210 (NAG 1-129)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0025, AN INVESTIGATION OF METHODS FOR EFFICIENT TRANSFER OF WEATHER INFORMATION TO THE PILOT

R.H. McFarland, Ohio University, Athens Campus, School of Engineering & Technology, Dept. of Electrical Engineering, *Athens, Ohio* 45701 (NAG 1-124)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0026, HELICOPTER LANDING GEAR DESIGN AND TESTING CRITERIA INVESTIGATION

J.D. Crist, Bell Helicopter Textron, *Hwy. 183, P.O. Box 482, Fort Worth, Texas* 76101 (DA0E3860; DAAK51 79 C 0011)

To develop new landing gear design criteria/military specifications for all classes of Army helicopters. Main thrust of program is to derive a single specification that will incorporate design, testing, crashworthiness, handling, etc., for both wheel- and skid-type Army helicopter landing gear.

A survey of helicopter landing gear design, test, accident, etc., related documentation will be performed. These findings will be used to modify existing landing gear specifications and assess MIL-l-XXXX specification (proposed). The resulting criteria will be evaluated for conformity of application to all classes of Army helicopters. Either MIL-l-XXXX will be recommended for adoption as a totally new specification or the existing design specifications will be modified as required.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0027, AERONAUTICAL TECHNOLOGY, TECH AREA I - AERODYNAMICS TECHNOLOGY

J.L. Shipley, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Structures Lab., *Mail Stop 266, Hampton, Virginia* 23665 (DA0E3551)

Develop and demonstrate the technology, techniques, and design criteria necessary to provide adequate performance, stability, control, and handling qualities for the Army's rotary

wing missions, and to improve the capability to analyze and predict these characteristics in existing and future aircraft. This technology is necessary to increase aircraft availability and survivability as well as provide for improved operational effectiveness and mission capability of Army aviation systems.

Objectives are accomplished by conducting analytical, ground-based simulations, whirl tower, wind tunnel, and flight test investigations in joint participation with NASA. Research will include wind tunnel and flight test of advanced airfoils and tip shapes, design of a v-tail configuration and improvements in forward flight performance analysis. Acoustics research will be conducted to identify noise sources, improved prediction capability, and development of methods for reducing noise without performance degradation. Evaluate the ogee tip on the AH-1 IMRB.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Structures Lab.

1.0028, HIGH TEMPERATURE STRUCTURES FOR LIFTING REENTRY VEHICLES

A. Hepler, U.S. National Aeronautics & Space Admin., Langley Research Center, *Hampton, Virginia* 23665 (DF146100)

The Air Force function supported by this effort is the high temperature structures for advanced lifting reentry vehicles. In order to make these vehicles feasible, structures are required that are reusable and durable and that can meet required cost and weight criteria. The goal of this effort is the development of high temperature structures and thermal protection systems that demonstrate extended life characteristics and low mass fractions. These structural advances are required to make possible advanced Air Force space missions.

Initially, design trade-off studies of alternative concepts will be conducted. These trade-off studies will identify optimum concepts which will be pursued in latter phases of this program. The latter phases will design, fabricate and environmentally test small 'proof of concept' specimens for the selected configuration.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0029, DEVELOPMENT AND APPLICATION OF OPTIMUM SENSITIVITY ANALYSIS OF STRUCTURES

W.L. Hallauer, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Aerospace & Ocean Engineering, *Blacksburg, Virginia* 24061 (NAG 1-145)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0030, UNSTEADY BOUNDARY LAYER INJECTION

D.P. Telionis, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Engineering Science & Mechanics, *Blacksburg, Virginia* 24061 (NAG 1-146)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0031, FIXED-GAIN CONTROLLER DESIGN FOR AIRCRAFT

Y. Baram, Tel Aviv University, *155 Herzl St., Tel Aviv, Israel* (DF702810; AFOSR-80-0178)

AF function - research in flight dynamics systems. Deficiency - the dynamic characteristics of aircraft change drastically with changes in altitude and air speed. Classical control synthesis techniques cannot cope with these conditions. Work is required in the development of advanced control theory and applied to advanced vehicles. Research -the researcher proposes to design a controller for a control-configured fighter that will be of the simplest possible structure subject to optimality and handling qualities criteria. How research contributes -the research will evaluate the ability of adaptive control techniques to design simple controllers minimizing the necessary airborne computation and data storage requirements and the dependence on accurate air data.

A minimal mode adaptive controller will be synthesized for a control configured fighter and used to design a fixed-gain backup controller which will not require air data. The performance of this controller will then be analyzed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, European Office of Aerospace Research & Development

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, LARGE SPACE STRUCTURE DAMPING DESIGN

W.D. Pilkey, University of Virginia, School of Engineering & Applied Science, Dept. of Mechanical & Aerospace Engineering, *Garrett Hall, Charlottesville, Virginia* 22903 (NAG 1-137)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, JOINT MATERIAL EVALUATION STUDY SEMI-INSULATION GAAS

M. Omori, Avantek Inc., *3175 Bowers Ave., Santa Clara, California* 95051 (DN980337; N00173-78-C-0214)

The objective of this program is to provide device information on the quality of semi-insulating substrates grown by the liquid encapsulated Czochralski method. The substrates shall be low chromium-doped, chromium- and tellurium-doped, and high purity undoped. The device structure shall be the field effect transistor.

To evaluate gallium arsenide substrates which have been prepared by liquid encapsulated Czochralski growth. To ion implant active layer directly into substrate as well as to grow epitaxial layers on the substrate. Field effect transistors shall be prepared and electrical evaluation will be used as an indication of suitability of substrate material for microwave-device applications.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

3.0002, METAL CLUSTER AND METAL SURFACE ANALOGY

E.L. Muetterties, University of California, Berkeley Campus, Lawrence Berkeley Lab., *Berkeley, California* 94720 (005969 TICNO; 4018)

A definition of the coordination chemistry of transition metal surfaces on a comparative basis with that of molecular metal complexes and molecular metal clusters is the research objective. Displacement reactions supplemented with diffraction and spectroscopic data will be utilized in the elucidation of structural, bonding and chemical features of metal surfaces with chemisorbed molecules. Initial studies are focussed on the chemisorption states of aromatic hydrocarbons, olefins and acetylenes on nickel and platinum surfaces. Catalytic reactions of these molecules will be examined in an ultrahigh vacuum chamber equipped with an isolation cell. These catalytic reactions will be closely correlated with metal cluster research so as to obtain a precise comparison between homogeneous and heterogeneous catalysis. Theoretical analysis based on symmetry matching of energetically available metal surface orbitals with those of molecules and molecular fragments of hydrocarbon have been developed for a further comparison with structural data.

BIBLIOGRAPHIC REFERENCES: Muetterties, E.L., and J. Stein, Mechanistic Features of Catalytic Carbon Monoxide Hydrogenation Reactions, Chem. Rev. 79: 479 (1979). Muet-

terties, E.L., et al, Clusters and Surfaces, Chem. Rev. 79: 91 (1979).

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

3.0003, MATERIALS AND ENVIRONMENTAL INTERACTIONS - DIRECT OBSERVATIONS BY HIGH VOLTAGE ELECTRON MICROSCOPY AT 3MEV

G. Thomas, University of California, Berkeley Campus, School of Engineering, Dept. of Materials Science & Engineering, *Berkeley, California* 94720 (INT79-18594)

This award will support Professor Gareth Thomas of the University of California at Berkeley for a period of one year in a program of cooperative research with Professor Hiroshi Fujita of Osaka University in Japan for the purpose of studying the effects of environment on the structure and composition of materials observed directly by high voltage electron microscopes under a variety of physical conditions of temperature, stress, and irradiation. The study will utilize the 3MEV HVEM electron microscope at Osaka University, one of only two instruments in the world (the other being in France). The project involves the in-situ study of the effects of applied stress on electron irradiation damage in metals and ceramics in various controlled atmospheres. In addition, studies will be made of dislocations motion in the important new class of dual phase steels which have great advantage for weight, and thus fuel, savings in transportation. This will be the first time that this Osaka facility will be available to a non-Japanese scientist. This project is sponsored jointly by NSF and by the Japan Society for the Promotion of Science under the U.S.-Japan Cooperative Science Program.

SUPPORTED BY U.S. National Science Foundation, Directorate for Scientific Technological & Internat. Affairs, Div. of International Programs

3.0004, SLATER ORBITALS IN QUANTUM CHEMISTRY CALCULATIONS

G.A. Segal, University of Southern California, School of Letters Arts & Sciences, Dept. of Chemistry, *3551 University Ave., Los Angeles, California* 90007 (NAG 2-77)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

3.0005, INFRARED CHEMILUMINESCENCE STUDIES OF ION-MOLECULE REACTIONS IN A FLOWING AFTERGLOW

S.R. Leone, University of Colorado, Boulder Campus, School of Arts & Sciences, Dept. of Chemistry, *1200 University Ave., Boulder, Colorado* 80302 (DF051780; AFOSR-78-3565)

AF function - Air Force operations in reconnaissance, communication, detection and discrimination require understanding of complex atomic, molecular and ionic chemical phenomena that take place in the natural and disturbed atmosphere. Deficiency - there is insufficient understanding of fundamental processes of ion-molecule reactions involving atmospheric constituents which can emit various forms of radiation. Objective - investigate the fundamentals of ion-molecule reactions by studying infrared chemiluminescence in a flowing afterglow apparatus. Obtain information on product state vibrational distribution occurring in ion-molecule reactions. In cases where reactions are highly exothermic and produce very highly excited vibrational states, obtain relaxation rates of such highly excited species and measure vibrational deactivation rates of molecular ions. How work contributes - provides a measure of ionic species formed in atmospheric reactions, radiation emitted from such species, and lifetimes and deactivation processes. Also, will have a bearing on emissions and lifetimes of species formed in rocket exhausts in atmosphere.

A flowing afterglow apparatus, incorporating mass and infrared detectors, will be constructed and will permit detailed wavelength and time-dependent studies of ion molecule reactions which yield infrared chemiluminescence. A unique flow, reverse-drift region will be used to select only positive or negative ions for study with removal of neutral radicals. Specific systems to be studied involve many reactions of interest in the upper atmosphere and sources of atmospheric infrared emissions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0006, ELECTRON DISLOCATION INTERACTIONS AT LOW TEMPERATURES

J.M. Galligan, University of Connecticut, Storrs Campus, Inst. of Materials Science, Dept. of Metallurgy, *Storrs, Connecticut* 06268 (EY-76-S-02-2305)

We plan to measure the interaction of dislocations with electrons in zinc, especially as it is affected by magnetic fields. In addition, we also plan to study the concentration dependence of the electron drag in Cu-Al alloys and Cu-Ag alloys. Finally, we are going to extend our measurements of the mobile dislocation density to examine other parameters that affect the mobile density. We have measured the electron drag in Zn and Cu-Al alloys and we have shown that these results are consistent with the dislocations moving as underdamped oscillators. We have measured the mobile dislocation density in Pb-In, as a function of stress and strain.

SUPPORTED BY U.S. Dept. of Energy, Materials Sciences Div.

3.0007, AN INVESTIGATION OF SOME BASIC PROPERTIES OF HYBRID COMPOSITE MATERIALS (16666-E)

T.W. Chou, University of Delaware, School of Engineering, Dept. of Mechanical& Aerospace Engineering, *Newark, Delaware* 19711 (DA0G3261; DAAG29-80-K-0057)

To develop analytical methods for predicting elastic moduli of hybrid composites and the compressive strength of unidirectional hybrids. To conduct experiments to verify the above theoretical study. Relevance: In recent years, the Army has turned more and more to fibrous composites in numerous applications: aircraft (rotor blades, fuselage), missiles (launcher, fins), bridging (beams), vehicles, lightweight weaponry and protective materials (armor, tank liners). Basic understanding of the properties of such materials are essential for design, analysis, and fabrication.

For the determination of the moduli, the following three methods will be considered: the self-consistent model method, statistical method, and finite element analysis. Experimentally, two hybrid composite systems (intermingled and unidirectional hybrid composites) will be considered for moduli and strength measurements.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0008, DIMENSIONAL STABILITY AND MICROCREEP BEHAVIOR OF GYRO-STRUCTURAL MATERIALS

B.W. Christ, U.S. Dept. of Commerce, National Bureau of Standards, *Washington, District of Columbia* 20228 (DN775553; N00014-80-F-0001)

It is desired to develop new solid gyro-structural materials used in inertial instrument units for guidance and control of space vehicles and missiles. There are two immediate goals. One is to develop a data base on the microcreep rates of instrument-grade Be alloys for use by gyroscope designers. The other is to develop fundamental understanding of the causes of dimensional instability in instrument-grade Be materials.

Measurements will be made on commercial instrument-grade alloys (Brush-Wellman and Kawecki-Berylco). An existing laboratory testing system (10 negative exponent 7), utilizing parallel-plate capacitors, and appropriately designed and machined samples, has been set up and put to work. A completely new laboratory testing system, an order of magnitude more accurate (10 negative exponent 8), utilizing laser interferometry, is being constructed, and requisite samples prepared. Microplastic properties to be measured include microcreep rates, and zero-load dimensional changes. Microyield stresses are being received from vendors and correlated with the cited properties. Micros-

tructural observations are being made, using a variety of techniques.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0009, STRUCTURE OF MATERIALS - ALLOY PROPERTIES

D.J. Lam, U.S. Dept. of Energy, Argonne National Lab., *9700 S. Cass Ave., Argonne, Illinois* 60439 (005300 TICNO; 58101)

The research in this activity is a coordinated experimental and theoretical effort to determine the electronic structure and related physical properties of alloys, compounds, and glasses of importance in energy systems. A number of physical-property measurements including magnetization, x-ray photoelectron spectroscopy (XPS), ultraviolet photoelectron spectroscopy (UPS), angle-resolved photoemission spectroscopy (ARPES), de Haas-van Alphen (dHvA) measurements, and extended x-ray absorption fine structure (EXAFS) and solid-state theory are employed to discern details of the electronic and magnetic structure.

BIBLIOGRAPHIC REFERENCES: Ching, W.Y., D.J. Lam and C.C. Lin, Theoretical Studies of Electronic States Produced by Hydrogenation of Amorphous Silicon, Phys. Rev. Lett. 42(12): 805-809 (Mar 1979).

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

3.0010, STRUCTURE AND DYNAMICS OF LARGE MOLECULES IN SOLUTION - CARBON-13 NUCLEAR MAGNETIC RESONANCE STUDIES

A. Allerhand, Indiana University, Bloomington Campus, School of Arts & Sciences, Dept. of Chemistry, *Memorial Hall, Bloomington, Indiana* 47401 (CHE79-16899)

Professor Allerhand is supported by a grant from the Structural Chemistry and Thermodynamics Program and the Biophysics Program. Carbon-13 Fourier transform nuclear magnetic resonance (NMR) spectroscopy, a technique which permits the observation of individual carbon atoms of large and complex molecules in solution, will be used in the following projects: (1) Detection and quantitative determination of linear (aldehydo and aldehydrol) anomers of simple monosaccharides. (2) Studies of structural features and variations in heparin and other polysaccharides of biological importance. (3) Studies of the dynamic behavior (internal motions) of polysaccharides and glycoproteins in aqueous solution. (4) Comparative studies of internal motions in various classes of small globular proteins. The goal of all these projects is to develop a better understanding of the structures of monosaccharides, polysaccharides, proteins, and glycoproteins. These types of molecules all have many vital roles in living systems; hence it is expected that these studies will facilitate the understanding of the biological function of these molecular systems.

This research is a continuation of that currently supported by Foundation Grant, CHE-7617572.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Chemistry

3.0011, FLOW LEADING TO FRACTURE

P.P. Gillis, University of Kentucky, School of Engineering, Dept. of Metallurgical Engineering, *Limestone & Euclid, Lexington, Kentucky* 40506 (DF049330; AFOSR-77-3379)

AF function - improved quality of aerospace vehicle structures can lead to enhanced durability. Deficiency - the basic understanding of the mechanics of metal deformation during processing do not exist to the degree which can lead to improved quality of structures. Objective - the objective of the research is to understand the stress and deformation states of a metallic material as it is processed and the relationship of these states to fracture. How work contributes - this research contributes to the basic understanding of metal deformation processes which can affect af manufacturing technology efforts.

Based on a material constitutive law which considers both the hardening and strain rate effects, a theory is being investigated which will predict the regions of material flow (yielding) and the kinematic boundaries. This theory was applied to one-dimensional problems during the past year. Extension of this theory to two dimensions will be the central focus of the present research. Also, material phase transformations will be studied for possible modifications to the basic constitutive behavior.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0012, DISSOCIATIVE RECOMBINATION OF O2 ION, NO ION AND N2 ION

S.L. Guberman, Boston College, Chestnut Hill Campus, School of Arts & Sciences, Dept. of Chemistry, *140 Commonwealth, Chestnut Hill, Massachusetts* 02167 (NAG 2-89)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

3.0013, CLAYS AND THE ORIGIN OF LIFE

J.S. Lewis, Massachusetts Inst. of Technology, School of Science, Dept. of Earth & Planetary Sciences, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAGW 114)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

3.0014, DEVELOPMENT OF SINTERABLE SILICON NITRIDE (DA0H4708)

G.E. Gazza, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0G0067; TBD)

High density, high strength silicon nitride is currently a prime candidate ceramic for axial gas turbine rotor hubs, radial rotors, Stirling engine heater heads and possibly other critical components in these advanced engines as weli as in high temperature diesel engines. The extensive use of this material in these applications and indeed its ability to be formed in complex shapes such as complete integral (bladed) axial or radial turbine rotors is dependent upon finding an alternative fabventional sintering process. It is the objective of this task to develop properties and economics for application as components in heat engines.

The contractual tasks involve sintering of silicon nitride using high nitrogen over pressures, i.e., 2-8 MPA. This allows higher sintering temperatures to be used as it suppresses the decomposition of the material. At G.E., the use of BeSiN2 as an additive promotes high temperature creep resistance and oxidation resistance. An 80 MPA N2 treatment improves density. At UTRC, oxide additions, Y203-Al2O3, are being used to promote sintering. Minimizing Al2O3 to reduce glassy phase is important. At University of Washington, wetting studies of various additives on Si3N4 will be performed.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0015, MACRO/MICRO STUDIES OF HYDROGEN EMBRITTLEMENT MECHANISMS IN TITANIUM AND ALUMINUM ALLOYS

W.W. Gerberich, University of Minnesota, Minneapolis Campus, School of Engineering, Dept. of Chemical Engineering & Materials Science, *105 Morrill Hall, Minneapolis, Minnesota* 55455 (DF046300; AFOSR-77-3133)

AF function - hydrogen embrittlement is a serious problem that causes mechanical property degradation in our most significant aircraft materials including steels, titanium, aluminum and nickel-base alloys. The various forms of hydrogen-related mechanical property degradation severely restrict the serviceability of important aircraft materials. Opportunity - basic understanding of the manner by which hydrogen acts to reduce mechanical strength and cause failures is important if we are to minimize and control these forms of attack. Objective - this research will investigate the hydrogen embrittlement susceptibility of titanium and aluminum alloys from both macroscopic and microscopic points of view. Macroscopic studies will focus on a fracture mechanics evaluation of the effects of gaseous and internal hydro-

gen on threshold stress intensities and crack growth conditions, microscopic studies will focus on the mechanistic details of nucleation and growth processes in concentration gradients. How work contributes - this not only has ramifications to alloy design, but carries specific ramifications to component design where sustained load, spectrum fatigue loading or corrosion fatigue might be encountered.

Factors to be investigated include specimen thickness, internal versus external hydrogen, temperature effects, phase stability, hydride formation, decohesion at particle-matrix interfaces, and in situ concentration profiles.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0016, ACCURATE AND COMPACT CORRELATION FUNCTIONS FOR MANY ELECTRON ATOMIC AND MOLECULAR SYSTEMS

J.W. Moskowitz, New York University, Washington Square & University College of Arts & Sciences, Dept. of Chemistry, *100 Washington Sq. E., New York, New York* 10003 (CHE80-10719)

This grant supports research under the Quantum Chemistry Program for investigation of electronic structure theory. A proper description of the instantaneous correlation of electronic motion is one of the central theoretical problems in chemistry. Correlation effects are responsible for many important chemical phenomena including molecular dissociation to neutral atoms.

Professor Moskowitz will apply the Metropolis Monte Carlo method to develop compact and accurate correlation functions for many electron atomic and molecular systems. The essence of the method is the Monte Carlo simulation of a many-fermion system by the proper sampling of the square of a correlated antisymmetric wavefunction. The principal advantage of the method is that the interelectronic distance, rij, may be included directly in the wavefunction without adding significant computational complexity. As a result, the method can be applied quite generally to systems of any reasonable size, shape, or number of electrons. An objective of the research is to test functional forms for the computation and understanding of correlation energy of many electron atoms and molecules.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Chemistry

3.0017, FLOW AND FATIGUE FRACTURE OF TITANIUM ALLOYS

H. Margolin, Polytechnic Inst. of New York, Brooklyn Campus, School of Science & Engineering, Dept. of Physical & Engineering Metallurgy, *333 Jay St., Brooklyn, New York* 11201 (DN575245; N000L4-80-C-0742)

This program will investigate the mechanisms of embrittlement in titanium alloys due to internal hydrogen. An understanding of this process should provide methods for improving the reliability of advanced naval structures.

A complete review of U.S. and foreign research related to hydrogen effects on mechanical properties and embrittlement in titanium alloys will be conducted. Titanium specimens will be studied with regard to diffusion and segregation of hydrogen within alpha and beta phases and interfaces. Hydrogen mobility will be analyzed as affected by stress and alloy composition. X-ray diffraction, microscopy and nuclear microprobe will be employed to characterize the microstructures and to measure the local hydrogen concentrations.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0018, THEORETICAL INVESTIGATIONS OF THE ELECTRONIC STRUCTURE OF MOLECULES

R.G. Parr, University of North Carolina, Chapel Hill Campus, School of Arts & Sciences, Dept. of Chemistry, *Chapel Hill, North Carolina* 27514 (CHE77-22951)

Dr. Parr will carry out theoretical studies to solve diverse problems in molecular structure and conformation. Special emphasis will be given to the development of simple models and the development and exploitation of density functional methods, but improvements for both ab initio and semiempirical quantum-mechanical calculation also will be sought. This research represents a continuation of that currently supported by Foundation grant CHE-7504128.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Chemistry

3.0019, THERMAL DEGRADATION OF PRESSURE MODULATOR RADIOMETER POLYIMIDE

H. Ishida, Case Western Reserve University, School of Science, Dept. of Chemistry, *2165 Adelbert Rd., Cleveland, Ohio* 44106 (NAG 3-126)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

3.0020, MICROSTRUCTURE/PROCESSING CONTROL FOR ALUMINUM P/M WROUGHT PRODUCTS

J. Waldman, Aluminum Co. of America, *Alcoa Center, Pennsylvania* 15069 (DA0B0679; DAAK10-79-C-0193)

The overall objective of this project is to investigate the interrelationship of process variables on the structure and properties of high strength aluminum P/M wrought products. This objective is to be accomplished by two contracts. This work is directed towards the technology area of armament with a major thrust of advanced armament concepts. In addition, the work is of importance to structural aircraft and helicopter parts, bridging and armor.

The project will involve a lab phase (phase I) and production and evaluation of wrought products from 3200 pound billets of CT90 and CT91 alloys (phase II).

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Fire Control & Small Caliber Weapon Systems Lab.

3.0021, INVESTIGATION OF RELATIONSHIPS AMONG MACHINABILITY, WEAR AND CAVITATION EROSION OF MATERIALS

D.K. Chaudhuri, State University & Community College System of Tennessee, Tennessee State University, Graduate School, *Nashville, Tennessee* 37203 (NAG 3-125)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

3.0022, LIQUID CRYSTALLINITY IN SEMI-RIGID POLYMERS AND IN MODEL COMPOUNDS

R.A. Orwoll, College of William & Mary, Williamsburg College, School of Arts & Sciences, Dept. of Chemistry, *Ewell Hall, Williamsburg, Virginia* 23185 (NAG 1-144)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

3.0023, MODELING OF THIN-FILM GALLIUM ARSENIDE (GAAS) GROWTH

J.H. Heinbockel, Old Dominion University, School of Sciences & Health Professions, Dept. of Mathematical Sciences, *P.O. Box 6173, Norfolk, Virginia* 23508 (NAG 1-148)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

3.0024, INVESTIGATION OF ADHESIVE/ADHERENT AND FIBER MATRIX INTERACTIONS

J.P. Wightman, Virginia Polytechnic Inst. & State University, School of Arts & Sciences, Dept. of Chemistry, *Blacksburg, Virginia* 24061 (NAG 1-127)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

3.0025, FRACTURE MECHANISMS IN FIBROUS COMPOSITES

P.W. Beaumont, University of Cambridge, *Hills Rd., Cambridge, England, United Kingdom* (DF052720; AFOSR-78-3644)

AF function - future high performance flight vehicles will require improvements in structural efficiency. Deficiency - inadequate understanding of composite fracture exists when environmental exposure is considered. Objective - the objective of this research is to understand and develop a theory to predict fracture of advanced composites and hybrids under conditions of elevated temperature and moisture. How work contributes - this research contributes to the Air Force ongoing effort in advanced composite structures technology.

Both theoretical and experimental efforts will be pursued under this research grant. Fracture mechanisms such as relaxation, debonding, pullout, splitting, crazing, etc. will be studied under environmental exposure conditions. Both crack initiation and propagation behavior will be investigated. In addition, the behavior of hybrid composites will be considered. Fibers to be studied include glass, graphite and Kevlar.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, APPLICATION OF DIGITAL TECHNOLOGY TO GUIDANCE AND CONTROL THEORY

S. Seltzer, Control Dynamics Co., *701 Corlett Dr., Suite 2, Huntsville, Alabama* 35802 (DA0G2889; DAAK40-79-C-0213)

To develop discrete-time design techniques and discrete adaptations of optimal control theory, and extend parameter-space analysis techniques to insure development of effective guidance and control systems for future missiles.

Investigate a sensitivity problem due to clustering of system poles and zeros in the parameter space technique of digital system analysis/design. Develop a technique to solve the clustering problem. Propose at least three (3) candidate advanced optimal control systems for evaluation against future targets, onboard microprocessor technology, sensor technology and airframe models of future missiles. Apply advanced analysis and design techniques to candidates.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Guidance & Control Directorate

4.0002, CARBON AND GRAPHITE AEROSOL - CHARACTERISTICS AND POTENTIAL ENVIRONMENTAL IMPACT

M.K. Mazumder, University of Arkansas, Little Rock Campus, School of Technology, Dept. of Electronics & Instrumentation, *P.O. Box 3017, Little Rock, Arkansas* 72203 (R807182-02; GC07 - 0486)

OBJECTIVE: Measure physical characteristics of carbon fiber aerosol, particularly aerodynamic properties, and to develop instrumentation for identifying and monitoring carbon fiber aerosol in ambient conditions.

APPROACH: Conduct experiments to simulate the production of carbon fiber aerosol in real processes; characterize the physical properties of carbon fiber aerosol as produced in simulated processes; design and construct instrumentation for field measurement of carbon fibers.

PROGRESS: Measurements have been made of the aerodynamic diameters of carbon fiber fragments resulting from saving of composites.

SUPPORTED BY U.S. Environmental Protection Agency, Office of Research & Development, Environmental Sciences Research Lab.

4.0003, THE DEVELOPMENT AND APPLICATION OF NOVEL METHODS FOR THE SOLUTION OF EMP-SHIELDING PROBLEMS

C.H. Papas, California Inst. of Technology, School of Engineering, Dept. of Engineering & Applied Science, *1201 E. California Blvd., Pasadena, California* 91109 (DF050080; AFOSR-77-3451)

AF function - nuclear detonations emit a short pulse of electromagnetic radiation (EMP) which may damage unprotected electrical systems when incident upon aircraft. To shield such systems an understanding of the penetration of radiation through apertures is required. Deficiency - the penetration of electromagnetic radiation through apertures in structures with complex geometries is unknown. This program will employ novel methods to obtain upper and lower bounds on this penetration. Objective - the objective of this research is to apply the theory of knots, the theory of braids and the theory of isoperimetric inequalities to obtain estimates, on the basis of geometrical data alone, of the penetration of electromagnetic radiation through apertures in bodies with complex configurations. Contribution -this study will provide important useful engineering tools.

The use of isoperimetric inequalities has been successfully applied in the symmetrization of a problem in EMP-shielding. Further use of this method and other geometric notions of pure mathematics will be employed to solve EMP-shielding problems having complex geometries. The utility of mathematical notions such as those contained in the theory of knots and braids will be investigated in attempts to obtain estimates of the penetration of radiation through apertures in aircraft.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0004, APPLICATION OF SURFACE ACOUSTIC WAVE DEVICES TO RADIO TELEMETRY

U. Strasilla, California State University & Colleges, San Jose State University, School of Engineering, Dept. of Electrical Engineering, *Washington Sq., San Jose, California* 95192 (NAG 2-85)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

4.0005, INVESTIGATION TO DETERMINE THE FEASIBILITY OF APPLYING THE SMIDS CONCEPT TO THE M-65 TOW GUIDED MISSILE ARMAMENT SUBSYSTEM

R. Depaul, Detex Systems Inc., *17871 Santiago Blvd., Suite 221, Villa Park, California* 92667 (DA0E3865; DAAK51 79 C 0013)

The objective of this study is to determine the feasibility of applying the SMIDS concept to the maintenance of the M-65 tow missile subsystem of the AH-1S aircraft.

This objective will be accomplished by a detailed study of the functional elements of the M-65 subsystem and by describing the maintenance procedures of these elements at the three levels of maintenance now used in the Army system. A determination as to the feasibility of applying SMIDS at these levels will then be made.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

4.0006, AEROELASTIC OPTIMIZATION WITH MULTIPLE CONSTRAINTS

S. McIntosh, Nielsen Engineering & Research Inc., *510 Clyde Ave., Mountain View, California* 94043 (DF053140; F49620-78-C-0105)

AF function - advanced flight vehicle structures of lighter weight and increased durability will be necessary to achieve future Air Force mission requirements. Deficiency - current aerospace vehicle designs do not reflect consistent consideration of disciplines influencing structural designs. Objective - the objective of this research program is to investigate structural optimization techniques applicable to multiple constraint conditions representative of aerospace vehicles. How work contributes - this effort is part of a program to develop the basic capability required to achieve optimal structural design in the Air Force.

Research program will investigate the efficiency and accuracy of basic solution algorithms for minimum weight structural designs. Primary attention will be given to math programming (MP) and optimality criteria (OC) algorithms involving flutter speed and vibrational constraints. Fixed and variable mode coordinate will be used in examining convergence to flutter speed and computational efficiency. Delta wing and high aspect ratio wing configurations will be used to investigate the solution accuracies.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0007, ANALYSIS OF COHERENT SATELLITE SCINTILLATION DATA

E.J. Fremouw, Physical Dynamics Inc., *La Jolla, California* 92038 (DF050590; F49620-78-C-0014)

AF function - satellite communications, deep-space surveillance and global positioning from satellite signals are all affected by scintillation due to the ionosphere. Deficiency - DNA and AFGL are investigating signal statistics due to ionospheric irregularities. However, to adequately understand, model and forecast the scintillations, their morphology and correlation with geophysical occurrences, as particle precipitation, needs to be accomplished. Objective - determine the morphology of subauroral scintillation and correlate their occurrence and relationships with the auroral electrojet, discrete auroral arcs, and particle precipitation. Contribution - an increase in the understanding of the physics of scintillations and possible insight into modelling is expected.

To analyze the VHF intensity and phase indexes from the DNA P76-5 satellite over Poker Flats, Alaska. Other geophysical information will be gathered and correlated with the scintillation data. Possible seasonal trends and the location and motion of the subauroral scintillation boundary will be investigated as will the relationships between scintillations and other obserable phenomena.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0008, WORLDWIDE PERFORMANCE OF TACTICAL MILLIMETER WAVE RADIO LINKS

J. Clark, Rand Corp., *1700 Main St., Santa Monica, California* 90406 (DA0F2854; DAAB07-77-C-0142)

The objective of this study program is to investigate the environmental performance of tactical millimeter wave transceivers operating in frequency bands from 35 GHz through 75 GHz, with voice, TV and data communications.

Using available worldwide rainfall data, calculations will be performed on radio fading, link performance, maximum range, outage/availability. Automated techniques for increasing link availability will be investigated by analyzing various operating parameters - power transmission, space, time/frequency diversity techniques, or a combination thereof. An investigation will be made of whether an enemy can use satellite meteorological data, airborne/ground weather radar data/sensor information, to determine if Army millimeter wave radio outages exist in order to gain tactical advantage.

SUPPORTED BY U.S. Dept. of Defense, Communications Research & Development Command, Center for Communications Systems

4.0009, APPLICATION OF MODERN COHERENT AND FOURIER OPTICAL TECHNIQUES TO FLUID MECHANICS RESEARCH

L. Hesselink, Stanford University, Graduate School, *Stanford, California* 94305 (NAG 2-83)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

4.0010, EXPERIMENTAL AND ANALYTICAL DEVELOPMENT OF SENSITIVE SUPERCONDUCTING ACCELEROMETER AND GRAVITY GRADIOMETER

W.M. Fairbank, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (DF041930; AFOSR-80-0067)

AF function - gravity gradiometer is required to determine the deflection of the vertical along flight path to improve the missile CEP. Deficiency - gravity gradiometers are required to operate with an accuracy of ten to the minus 12 G/M. This is so demanding that closed-loop mode operation will be essential. Although present technology of electronic components has reduced the thermal noise levels within the system to their equivalent Brownian motion, cryogenic techniques will be required to make any significant reduction in the respective noise levels. Objective - the properties of the accelerometer and gradiometer to be investigated indicated an exciting potential in applications which are presently difficult and beyond the state of the art of existing techniques. The extremely low threshold suggests measuring the gradient in the gravitational field without excessive averaging times. Contribution - inertial navigators are ultimately limited in accuracy by their knowledge of the local gravity field, in particular the tilt of local vertical. Therefore, improved gravity gradiometer will provide the necessary data to determine the deflection of vertical during the flight path or operation.

It is proposed that instrument design limitations and ultimate threshold sensitivity be investigated and experimentally verified.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0011, IMPLANTATION AND DIFFUSION OF IMPURITIES IN COMPOUND SEMICONDUCTORS WITH APPLICATION TO THE FABRICATION OF MICROWAVE DEVICES 15605-EL

J.F. Gibbons, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (DA0F9256; DAAG29-78-G-0119)

To establish physical mechanisms that are responsible for annealing and diffusion of implanted dopants in compound semiconductors, and to develop a mathematical model which will predict the implanted impurity profile after annealing from the established implantation conditions. Relevance: Ion implantation is being adopted as a basic processing technique for many new high-frequency discrete devices and high-speed integrated circuits. The understanding of the ion implantation process will be a necessary prerequisite to the development of a compound semiconductor device technology.

A rapidly emerging technique, that of laser-annealing of the implanted layer, will receive considerable attention as applied to both GaAs and InP. Here the emphasis will be directed towards establishing the proper condictions for laser-annealing, as well as understanding the physical mechanisms responsible for the electrical activation of the implanted species. Further work will also be carried out in the study of basic diffusion mechanisms occurring when GaAs and InP are annealed at high temperatures with a passivating layer.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0012, INTERFERENCE STUDY AMONG SATELLITE SYSTEMS OF VARIOUS MODULATION TECHNIQUES

B.B. Lusignan, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (NAG 3-151)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0013, SINGLE CHIP CCD LENSES FOR ULTRASONIC IMAGING

J.D. Meindl, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (DF050130; F49620-77-C-0133)

AF function - the maintenance and quality assurance of flight vehicles relies heavily on nondestructive evaluation (NDE) of critical metallic components. Deficiency - there is a deficiency in techniques to specify size, shape and orientation of flaws which initiate catastrophic failure. Objective - the objective of this research is to develop electronic focusing of acoustic field patterns detected by piezoelectric transducer arrays. How work contributes - the monolithic electronic lenses would serve to reduce present ultrasonic imaging system weight, volume, power consumption and cost as much as an order of magnitude. In addition, they would permit improvements in system resolution, field of view, range and frame rate heretofore unfeasible.

Cascade charge coupled device (C3D) integrated circuit analog delay lines will be explored for ultrasonic imaging systems. Various models will be developed to characterize the influence of device technology on lens performance. Theoretical analysis and fabrication methodology will be adjusted to optimize performance.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0014, STUDY OF JET IGNITION USING LIQUID FUELS

A.K. Oppenheim, University of California, Berkeley Campus, School of Engineering, Dept. of Mechanical Engineering, *Berkeley, California* 94720 (NAG 3-137)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0015, DIGITAL FILTERS - INTEGRAL APPROXIMATION THEORY

L.O. Ferguson, University of California, Riverside Campus, School of Natural & Agricultural Sciences, Dept. of Applied Science, *Riverside, California* 92502 (DF052230; AFOSR-78-3599)

AF function - to advance the design of cost-effective digital filters for radar, telemetry, and communications systems. Deficiency -the advantages of digital signal processing are so compelling that the AF as well as commercial communications companies is gradually converting all communications to digital systems. The applications, however, still contain some technological and economic problems that prevent the widespread usage of digital methods. Objective - to advance the theory of approximation of rational functions with rational or integer coefficients in order to effectively design realizable filters that closely approximate a desired ideal performance. How work contributes - success in this research could lead to vastly improved digital circuitry for the various electronic systems used in aerospace vehicles and communications networks.

The plan is to apply where possible the results on approximation by polynomials and rational functions with integral coefficients to the present problem of approximating a desired transfer function by rational functions with quantized coefficients, and to extend these results where necessary.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0016, DEVELOPMENT OF GAP-SI HETEROJUNCTION TRANSISTORS BY MOLECULAR BEAM EPITAXY (14570-EL)

H. Kroemer, University of California, Santa Barbara Campus, School of Engineering, Dept. of Electrical Engineering, *Santa Barbara, California* 93106 (DA0F9058; DAAG29-77-C-0041)

To extend performance limitations of silicon devices by incorporation of metallurgically unfavorable heterojunctions. The objective is specifically, but not limited to, growth and study of bipolar transistors with gallium phosphide emitters on silicon base and collector structures. Relevance: This research will broadly contribute to the science and technology base of electronic and optical (integrated optics) devices. Impact on the state of the art in transistors and photocathodes is expected.

Molecular beam epitaxial deposition techniques will be used to grow GaP on silicon taking advantage of existing Si technology. Lattice match, carrier transport and band GaPs will be studied to verify theoretically predicted device performance improvements. The basic limitations of MBE will be investigated.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0017, TURBULENT VORTEX FLAME STABILITY AND SPREADING WITH GAS JETS, HIGH PRESSURE DROPLET EVAPORATION/DECOMPOSITION, ETC.

P.R. Choudhury, University of Southern California, School of Engineering, Dept. of Mechanical Engineering, *3551 University Ave., Los Angeles, California* 90007 (DF035480; AFOSR-77-3354)

AF function - advanced airbreathing combustion engines and chemical explosive weapons, weapon delivery and defense, close air support, transport. Deficiency - insufficient fundamental understanding of the basic mechanisms and processes associated with turbulent reacting vortex (swirl) flows in advanced airbreathing combustors under steady-state and transient conditions, with coupled evaporation/decomposition processes at high pressure, and with programmed chemically sensitized homogeneous ignition and propagation of vortex combustion and unconfined fuel-air explosions. Objective - to formulate realistic analytical representations of gas jet-flame interactions, steady and transient ignition and flame phenomena, and actual fuel evaporation and pyrolysis processes associated with vortex stabilized combustion in advanced airbreathing combustors, and with homogeneous ignition, flame and detonation propagation in vortex combustion and distributed fuel-air clouds. How work contributes - will provide additional understanding and realistic analytical modeling of the transient and steady-state behavior of turbulent reactive flow fields and of spontaneous reactive additives on programmed homogeneous ignition in vortex combustion and fuel-air clouds, and will contribute to establishing realistic guidelines for developing efficient, stable advanced airbreathing combustors and determining the feasibility of possible new single-event fuel-air explosive devices, and in the application of broad range alternate fuels such as those derived from shale and coal.

A fundamental study will be made of the phenomena associated with the use of normal and swirl air jets as vortex amplifiers and swirl generators in environments typical of side-dump ramjet combustors. The principles necessary to optimize maximum combustion efficiency and combustion stability with minimum pressure drop will be established. special emphasis will be placed on investigation of fundamental mechanisms which can cause combustion instability and approaches for controlling such phenomena. Combustors of different sizes will be tested at USC and AFAPL to provide information on geometric scaling. Additionally, degradation of the vaporization process due to thermal decomposition of available fuels and alternative liquid fuels (e.g., shale oil and coal derived) will be studied in a high pressure environment typical of actual ramjets. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0018, NONLINEAR INTERACTIONS IN FREE SHEAR LAYERS AND JETS

P. Huerre, University of Southern California, School of Engineering, Dept. of Aerospace Engineering, *3551 University Ave., Los Angeles, California* 90007 (CME79-16162)

This project will investigate the influence of critical layer phenomenons on the nonlinear evolution and interaction of instability waves in shear layers and jets. Three particular areas will be analyzed: (1) the final stages of the nonlinear response in the high critical layer Reynolds number regime, (2) the amplitude evolution of low wave number disturbances, (3) and subharmonic resonance phenomena in jet flows.

Careful experiments have shown that the orderly structures found in jets are greatley enhanced by tailpipe forcing of a given frequency and that the jets respond nonlinearly for very low levels of input fluctuations. This investigation will develop a consistent description of time and space history of instability

waves and will advance our understanding of the response of a jet to external excitations.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science, Div. of Civil & Mechanical Engineering

4.0019, EFFECT OF SOLUTE-VACANCY PAIRS ON THE PHYSICAL PROPERTIES OF SI-DOPED GAAS, AND OTHER COMPOUND SEMICONDUCTOR SYSTEMS
W.G. Spitzer, University of Southern California, School of Engineering, Dept. of Electrical Engineering, *3551 University Ave., Los Angeles, California* 90007 (DF043410; AFOSR-76-2990)

AF function - microwave electronic devices are essential elements of Air Force communications, reconnaissance, surveillance and countermeasure systems. Opportunity - improved performance of these systems can be expected from use of better materials in devices that process microwave signals. Present microwave solid state device performance is limited by the defect structure in device materials. Objective - the objective of this research program is to obtain a more complete understanding of the defect structure of Si-doped GaAs and to track the effects of simple defect species on properties of GaAs that are important for signal processing devices. How work contributes - changes in quantities such as carrier density, infrared absorption, vacancy loop size and density, yield stress and luminescence caused by changes in thermodynamic conditions will be correlated and all explained on the basis of a common defect model.

Changes in quantities such as carrier density, infrared absorption, vacancy loop size and density, yield stress and luminescence caused by changes in thermodynamic conditions will be correlated and all explained on the basis of a common defect model. The effect of varying concentrations of Si and thermal treatments on the free carrier concentration, infrared absorption, photoluminescence, critical resolved shear stress and defect structure of Si-doped GaAs will be investigated. To measure total Si concentration in GaAs samples to within plus or minus 5 to 10 percent for 1 x 10 sup 17 less than or equal to Si concentration less than or equal to 5 x 10 19/cm 3, an electrochemical technique employing the solid oxygen ion conducting electrolyte, calcia stabilized zirconia (CSZ) in a cell such that EMFS can be used to measure oxygen fugacities which are related to the amount of Si in GaAs will be developed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0020, INVESTIGATIONS OF IMPURITY CONCENTRATIONS AND ELECTRONIC PROPERTIES OF SEMICONDUCTORS NEAR INTERFACES
D.B. Wittry, University of Southern California, School of Engineering, Dept. of Electrical Engineering, *3551 University Ave., Los Angeles, California* 90007 (DF049770; AFOSR-77-3419)

AF function - microwave solid-state electronic devices are essential components of Air Force surveillance, electronic countermeasures and communications systems. Deficiency - GaAs and InP are presently the most promising materials for these solid-state devices and many devices are fabricated by growing epitaxial layers on substrate of essentially the same material. Typically, however, the impurity concentration of the epitaxy and the substrate are different and it is this interface region which is not understood. An understanding of this interface region is necessary in order to correctly predict and control the performance of devices utilizing the epilayer/substrate structure. Objective - the objectives of this research are to determine the concentration of impurities in GaAs or InP substrates near the substrate/epilayer interface and to investigate the electronic properties of semiconducting substrates of GaAs and InP near this interface. How work contributes - this work will contribute to a better understanding of III-V semiconductor device performance by obtaining more knowledge concerning the epilayer/substrate interface region of these devices.

The initial portions of this work will deal with GaAs and be expanded to InP at a later date. In addition to studying the GaAs (InP) -epilayer on GaAs (InP) substrate, samples of GaAs or InP without epilayers will be subjected to various heat treatments in an effort to obtain a better understanding of how the loss of one of the atomic components affects interfacial impurity concentrations. Four experimental techniques will be used in this effort to first determine the nature of the defects and impurities which are present and then understand the reasons for the presence and formation of these defects and impurities. Both sputtered ion mass spectroscopy and electron probe x-ray microanalysis will be used to determine impurity concentrations in the interface region. Room temperature scanning cathodoluminescence microscopy will be employed to determine the influence of impurity concentration variation on radiative recombination of excess carriers while low temperature cathodoluminescence will be used to determine the energy levels of the interfacial impurities. Finally, electron beam-induced currents on angle specimens will be used to indicate the presence of P-N junctions and to provide information on minority carrier diffusion lengths near the interface.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0021, FEEDBACK SYSTEM THEORY
I.M. Horowitz, University of Colorado, Boulder Campus, School of Engineering & Applied Science, Dept. of Electrical Engineering, *1200 University Ave., Boulder, Colorado* 80302 (DF042660; AFOSR-76-2946)

AF function - the design of feedback systems for Air Force turbojet system control. Deficiency - the synthesis of linear feedback system with no parameter uncertainty is a straightforward task. However, the synthesis of nonlinear feedback or linear single input-output multiple-loop systems with significant parameter uncertainties in order to satisfy quantitative performance specifications is inherently difficult and no effective procedures are available for these problems. Objective - the objective of this research program is to extend the synthesis theory for systems of the nonlinear feedback class to an infinite set of system inputs. Objective is how best to divide the feedback burden between the loops of the linear single input-output multiple-loop system. How work contributes - success here would result in improved performance in major Air Force systems.

The approach will be to extend the quantitative synthesis technique developed under this research effort to nonminimum-phase system inputs which leads to linear time invariant plane equivalents having both zeros and poles in the right half-plane. This technique will also be extended to nonlinear uncertain plants with nonzero initial conditions and to designs which have economy in loop-band width. Finally, it is proposed to extend quantitative feedback synthesis to the last linear time invariant area for which it does not, as yet exist - to linear time invariant plants whose uncertainty includes uncertain right half plane poles and zeros.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0022, MICROWAVE RADIATION AND THERMOREGULATION
E.R. Adair, John B. Pierce Foundation of Connecticut, *290 Congress Ave., New Haven, Connecticut* 06519 (DF049760; AFOSR-77-3420)

AF function - Air Force operating environments expose personnel to a wide variety of environmental stresses and potential hazards which limit or degrade man's ability to perform effectively. These stresses include electromagnetic radiation. Current technology does not permit an adequate assessment of responses and tolerance to single, sequential or long-term exposure to these radiations. The ability to compare RF radiation exposure to known thermal consequences is unique and could be an important contribution to the controversy regarding 'hot spots'. Deficiency - in recent years, the effort in the US dealing with effects of nonionizing radiation on biological systens has increasingly been directed toward the effects produced by low levels of irradiation. These levels have been characterized as having no obvious 'thermal' consequences within the organism under study. This research emphasis has been generated partly by the discrepancy between permitted exposure levels in this country and the Soviet Union and partly by reports emanating from several Eastern European countries of assorted malfunctions of the central nervous system resulting from prolonged low-level mi-

crowave irradiation. If such CNS malfunction could be rigorously demonstrated at any level (from cellular organization to complex behavioral patterns), this would provide definitive grounds for reconsideration of the US maximum permissible exposure levels. Objective - the primary goal is to learn whether low levels of microwave radiation can influence or interfere with normal responses, both physiological and behavioral, that function to regulate the body temperature. The ultimate goal is to evaluate the impact on such disturbances on the human thermoregulatory system with reference to current maximum permissible exposure standards. Contribution - research will support and contribute to on-going work prescribed in subarea 1.8 'Environmental Protection and Toxicological Hazards' and RO 1.8.1.2, 'Electromagnetic Radiation.'

The research proposes to expose restrained squirrel monkeys to specific durations and intensities of microwave irradiation 1) during ongoing behavioral thermoregulation and 2) during measurement of autonomic responses of heat production and heat loss at a variety of discrete ambient temperatures. Investigations will inclide examination of microwave effects on internal thermoreceptors in the hypothalamus and body regions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0023, DEVELOP A NAVIER-STOKES ANALYSIS FOR THE AFT-END FLOW FIELD OF AERODYNAMIC VEHICLES (15905-E)

H. McDonald, Scientific Research Associates Inc., *P.O. Box 498, Glastonbury, Connecticut* 06033 (DA0G8961; DAAG29-79-C-0003)

To develop a Navier-Stokes solution for the viscous elliptic portion of jet plume interaction flow fields in the vicinity of an axisymmetric base. Relevance: The research is directly relevant to the improved design of Army missiles, rockets and projectiles.

A local flow field Navier-Stokes analysis including flow both upstream of the base where a shock wave-boundary layer interaction may occur on a boattail and downstream of the base where recirculation may be present will be carried out. This detailed solution then would be joined either to inviscid solutions or viscous parabolic solutions in an interactive manner to determine the entire flow field.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0024, INTERFACIAL CHEMICAL REACTIONS IN FLOW SYSTEMS

D.E. Rosner, Yale University, School of Engineering, Dept. of Engineering & Applied Science, *206 Elm, New Haven, Connecticut* 06520 (DF029020; F49620-76-C-0020)

AF function - weapons delivery. Deficiency - materials technologies for reentry nose cones and heat shields, rocket nozzles, turbine and combustion chambers are seriously lacking in both theoretical understanding and reliable experimental data on basic gas-solid reactions at high-temperatures. Objective - the research will provide to system and materials engineers theoretical understanding and fundamental data on interfacial rate processes, both for gas-surface and gas-particle interactions. How work contributes - over a number of years, this research has been building up a body of useful data and rigorous computational techniques for treating interfacial flow systems.

Theoretical problems include extraction of intrinsic heterogeneous kinetic data from flow reactors with transport limitations, engineering implications of incomplete chemical energy accommodation, and the role of thermal diffusion mass transport in systems with phase change of heterogeneous chemical reaction. Experimental work will (a) extend the capability of the coaxial filament flow reactor to surface catalyzed oxidation reactions, (b) examine the enhancement, by atomic oxygen, of the high-temperature vaporization of refractory compounds, and (c) clarify the role of thermal diffusion mass transport in deposition and surface combustion applications.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0025, KINETICS AND SPECTROSCOPY OF AIRCRAFT AND ROCKET PLUME CONSTITUENTS

F.P. Tully, Georgia Technology Research Inst., *Atlanta, Georgia* 30332 (DF049370; F49620-77-C-0111)

AF function - defense, weapons delivery. Deficiency - reaction rate coefficients need to be reliably determined at elevated temperatures for advancement of rocket plume and aircraft combustion technologies. Objective - this work will obtain absolute rate constants for elementary bi-molecular free radical reactions of importance to the generation of a predictive understanding of hydrocarbon combustion processes and advanced fuel reactivity in aircraft and rocket exhaust plume environments. How work contributes - the results of this research will be used in authoritative AFOSR standard reference kinetic data tables, which in turn will provide development engineers with the required information in such areas as chemical emission from air-breathing engines (research objective 5.2.6.1) and advanced rocket plumes (research objective 5.1.2).

In this research program, the temperature dependence of bimolecular rate constants for radical-molecule reactions will be investigated using the high-sensitivity 'clean' technique of (laser/spark discharge) flash photolysis (resonance/laser induced) fluorescence. Direct measurements of absolute rate constants for selected radical oxidant-molecule reactions will be made in the temperature interval 300-1200K at pressures between 20 and 800 TORR. Specific reactions from among the sequence OH plus H2, D2, CH4, C2H6, C3H8, CH2O, HCl, and OH, OD plus CO, and O(3P) plus HCl will be investigated. Correlations between the measured experimental data and the predictions of theoretical models of bimolecular reaction rates will be examined, these comparisons will dictate the priority for study of reactions from the above sequence.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0026, CONTROLLABILITY AND EVOLUTION OF COHERENT STRUCTURES IN TURBULENT WAKES

J.L. Way, Illinois Inst. of Technology, Armour College of Engineering, Dept. of Mechanics & Mechanical & Aerospace Engineering, *3300 S. Federal St., Chicago, Illinois* 60616 (DF036430; F44620-76-C-0062)

AF function - advanced aerospace vehicles. Opportunity - gain a better understanding of the underlying concepts of turbulent wakes and their interactions. Objective - to provide data for the use of predictive schemes and answer basic questions concerning the character and evolution of large scale structures in turbulent flows and the interactions of the structures of different turbulence fields. How work contributes - will provide data and insight for the various sophisticated predictive schemes to be tested against prior to being used in the design of advanced aerospace vehicles.

Contrasting basic wake geometries will be studied, to be followed by combinations of the basic geometries that produce the most interacting flows. Data will be obtained by hot-wire anemometry and flow visualization. Conditional measurements based on the velocity vector will be used to obtain conditional flow patterns of the wakes from which structural information of the flow field can be deduced.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0027, DYNAMIC EFFECTS ON FRACTURE

J.D. Achenbach, Northwestern University, Evanston Campus, Technological Inst., Dept. of Civil Engineering, *633 Clark St., Evanston, Illinois* 60201 (DF052730; AFOSR-78-3589)

AF function - future flight vehicles must have improved reliability and durability to reduce AF costs. Opportunity - fracture mechanics is now in general use to predict the static behavior of flight structures. This research effort gives the opportunity to extend this approach to dynamic effects. Objective - the objective of this research is to understand the behavior of rapidly propagating cracks and to apply this understanding to crack-arrest mechanisms. How work contributes - results of this research will contribute both to studies related to vehicle safety of flight and to weapon effectiveness evaluations.

Proposal is theoretical in nature and based upon continuum mechanics. Two principal areas of research will be investigated,

high rate loadings on cracked structures, and fast fracture and crack arrest. High rate loading investigations will study elastodynamic stress intensity factors, influence of plastic material behavior and criteria necessary to initiate crack propagation. Fracture and crack arrest investigations will study the stress intensity factors for a rapidly propagating crack, energy balance, crack-arrestment mechanisms and dynamic phenomena such as non-self similar crack propagation and crack branching.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0028, MECHANICS OF SURFACE DAMAGE IN ELASTOHYDRODYNAMIC CONTACTS (16005-E)
H.S. Cheng, Northwestern University, Evanston Campus, Technological Inst., Dept. of Mechanical Engineering & Astronautical Science, *633 Clark St., Evanston, Illinois* 60201 (DA0G8912; DAAG29-78-G-0199)

To gain a basic understanding of pitting and scuffing failures in heavily loaded lubricated contacts in gears, cams, and rolling element bearings. Relevance: The subject has a high priority in the design of military vehicles and aircraft, particularly in helicopter gear box design.

Analytic and numerical determinations of subsurface stress distributions at asperities will be carried out for normal and tangential surface loads as well as for thermal conditions. Two- and three-dimensional solutions will be formed and related to pitting and scuffing.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0029, ENVIRONMENTAL DEVELOPMENT PLAN AND ASSESSMENTS
M.J. Bernard, U.S. Dept. of Energy, Argonne National Lab., *9700 S. Cass Ave., Argonne, Illinois* 60439 (005253 TICNO; 49205)

This project includes the preparation of an Environmental Development Plan for the Transportation Energy Conservation Division. This plan identifies the environmental, health, and safety issues associated with RD&D conducted by the Division and sets forth strategies for resolving these issues. This project also includes the preparation of Environmental Assessments for the Electric and Hybrid Vehicle Program, Alcohol Fuels, Turbocompound Diesel Engine, and Controlled Speed Accessory Drive System.

SUPPORTED BY U.S. Dept. of Energy

4.0030, PREPARATION OF A NASA REFERENCE PUBLICATIONS ENTITLED 'THEORY OF GEARING'
F.L. Litvin, University of Illinois, Chicago Circle Campus, School of Engineering, Dept. of Materials Engineering, *Box 4348, Chicago, Illinois* 60680 (NAG 3-136)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0031, TRANSIENT BEHAVIOR OF RADIATION AND SCATTERING FROM CONDUCTING BODIES
P.L. Uslenghi, University of Illinois, Chicago Circle Campus, School of Engineering, Dept. of Information Science, *Box 4348, Chicago, Illinois* 60680 (DF047600; AFOSR-77-3253)

AF function - wide band radar detection and EMP hardening of aerospace vehicles. Deficiency - algorithms for electromagnetic radiation and scattering under transient conditions need improvement. Objective - solutions will be sought to five problems in areas of uncertainty. How work contributes - solutions will enhance engineering understanding and thus aid design. Hopefully new design techniques may be suggested.

Solutions to the following problems in transient electromagnetic radiation and scattering will be sought and properties of interest in physical and engineering applications will be investigated. The five problems with the best understood first are transient radiation from spheroidal antennas, constraints on the singularity expansion method for early time transients, loop antennas in a dispersive environment, radiation from truncated guiding structures, and pulsed antenna array radiation pattern design techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0032, INVESTIGATION OF ADAPTIVE MULTIBEAM PHASED ARRAY TECHNIQUE
R. Mittra, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Electrical Engineering, *106 Engineering Hall, Urbana, Illinois* 61801 (NAG 3-149)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0033, AN IMPROVED NON-LINEAR DYNAMIC ANALYSIS OF FLAT PLATE LAYERED BODIES ACCOUNTING FOR LARGE TRANSVERSE DEFORMATION
A.R. Zak, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Aeronautical & Astronautical Engineering, *106 Engineering Hall, Urbana, Illinois* 61801 (DA0Q4503; DAAD05-77-C-0722)

First objective is to improve on existing finite element program (TIP) so as to obtain a more realistic determination of stress and deformation. The second objective is to reduce the execution time of the program.

The approach is to improve the constitutive equations used in the present TIP program and, if possible, modify the formulation of the problem so as to reduce the execution time.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Ballistic Research Lab.

4.0034, EVALUATING PERFORMANCE AND DEVELOPING ADDITIONAL APPLICATIONS FOR AN ADAPTIVE MULTIBEAM PHASED-ARRAY COMMUNICATION SYSTEM
A.W. Biggs, University of Kansas, Lawrence Campus, School of Engineering, Dept. of Electrical Engineering, *Learned Hall, Lawrence, Kansas* 66044 (NAG 3-150)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0035, EFFECTS OF SUPERSONIC PROP-FAN VELOCITIES ON ACOUSTIC STRUCTURAL FATIGUE
H.W. Smith, University of Kansas, Lawrence Campus, School of Engineering, Dept. of Aerospace Engineering, *Learned Hall, Lawrence, Kansas* 66044 (NAG 1-147)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

4.0036, CLOUD/ICING/VISIBILITY ANALYSIS SYSTEM (CIVAS)
W.D. Mount, Geo Atmospherics Corp., *P.O. Box 177, Lincoln, Massachusetts* 01773 (DA0F2203; DAAD07-79-C-0089)

To provide Army aviators with an automated procedure for estimating the current threat of icing conditions on a scale of 5 km.

Existing computer programs for analyzing cloud and visibility conditions from standard airways and synoptic observations will be modified to add temperature/icing and reduce the grid size of 5 km.

SUPPORTED BY U.S. Dept. of Defense, Electronics Research & Development Command, Atmospheric Sciences Lab.

4.0037, INVESTIGATION OF PHOTOACOUSTOREFRACTIVE EFFECTS IN LINBO3 SAW DEVICES (17243-P)
A. Linz, Massachusetts Inst. of Technology, Graduate School, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DA0G2341; DAAG29-80-C-0074)

To explore the surface properties of ferroelectric materials. Relevance: HDL has pioneered the use of surface acoustic wave

systems for optical correlation and acousto-optic signal processing devices. As such it needs information about the surface processes in order to predict the efficiency and stability of systems using ferroelectric materials.

The surface of crystals of lithium niobate will be measured by various probe techniques. Auger, internal reflections spectroscopy, photoelectron emission spectroscopy will be made on lithium niobate samples having differing photoacoustorefractive stored sensitivities.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0038, DEVELOPMENT OF A FAST ALGORITHM FOR COMBUSTION KINETICS CALCULATIONS

D.T. Pratt, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Mechanical Engineering, *Ann Arbor, Michigan* 48104 (NAG 3-147)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0039, WIND TUNNEL WALL INTERFERENCE

D.B. Bliss, Princeton University, School of Engineering & Applied Sciences, Dept. of Mechanical & Aerospace Engineering, *Box 430, Princeton, New Jersey* 08540 (DF048590; AFOSR-77-3337)

AF function - advanced aerospace vehicles. Deficiency - with the trend towards larger and/or higher performance transonic vehicles, engineering design will have to be reduced to a more rigorous science than is now possible with the present state of knowledge or simulation of transonic flow. Of prime importance for the future will be the ability of the scientist and engineer to obtain model data of unprecedented accuracy in transonic tunnels, thereby minimizing the costly consequences of costly errors in scaling model results to full-scale flight conditions. One of the problems in wind tunnel testing is the magnitude of the wind tunnel wall correction that must be made, particularly for large lift coefficients and/or unsteady (time-dependent) flows. Objective - the purpose of this research is to advance the state-of-the-art in analytically modeling the fluid dynamics of the flow about and through transonic wind tunnel walls and thereby provide theoretical guidance as to the magnitude of the wall interference correction as well as to improvements that can be made with designs of new wind tunnel walls. How work contributes - the vehicle designer relies heavily on data obtained in laboratory facilities to either improve or verify his design approach. Of prime importance in using this laboratory data is a firm grip on the exact magnitude of the facility interference on the data obtained. This problem is particularly acute in transonic testing where, in current facilities, significant corrections to the data are needed to account not only for facility artifacts but also scale.

A purely theoretical study wherein an attempt will be made to develop more sophisticated theoretical models of the flow about and/or through transonic wind tunnel walls. Walls to be considered will include solid flexible, slotted and porous configurations. After developing these models theoretical estimates will be made of the interference provided by these walls for two- and three-dimensional flows, both steady and unsteady. The concept of small perturbations of the infinite atmospheric solution will be used to obtain the magnitude of the wall interference.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0040, ANALYTICAL STUDIES OF TURBULENT FLOW FIELDS

G.L. Mellor, Princeton University, School of Engineering & Applied Sciences, Dept. of Aerospace & Mechanical Science, *Box 430, Princeton, New Jersey* 08540 (DF028700; AFOSR-79-0118)

AF function - advanced aerospace vehicles. Opportunity - increase capability for predicting separated turbulent flow problems. Objective - to develop a theoretical model and a numerical method useful for solving fully separated turbulent flows produced by steps, flat plates, and adverse pressure gradients normally encountered on lifting surfaces. How work contributes - improvement in predictive ability will permit better design of any system (airfoils, inlets, compressor and turbine blades) in which separated flows are important.

A second-moment turbulence model centered on hypothesis by Rotta and Kolmogorov has been developed to handle fully separated flows. Various separated flows will be examined and predictions compared to available experimental data. These will include flows where curvature effects are dominant, unsteady (ensemble mean) flows over bluff bodies, and internal waves in density-stratified flows.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0041, DEVELOPMENT OF THE LASER DOPPLER VELOCIMETER FOR TURBULENCE MEASUREMENTS IN NITROGEN

R.B. Miles, Princeton University, School of Engineering & Applied Sciences, Dept. of Mechanical & Aerospace Engineering, *Box 430, Princeton, New Jersey* 08540 (NAG 1-152)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

4.0042, III-V HETEROJUNCTION STRUCTURES FOR LONG WAVELENGTH INJECTION LASERS (DARPA AO 3137)

C. Nuese, RCA Corp., *Washington Rd., Princeton, New Jersey* 08540 (DA0D3115; DAAB07-76-C-0872)

To develop efficient injection lasers operating at room temperature (300 degree Kelvin) and emitting any desired wavelength in the 0.9-1.7 micron spectral range.

Heterojunction structures of quaternary III-V alloys (such as indium, gallium, arsenic, phosphorous) will be grown by the vapor phase epitaxy method. These structures will be evaluated for lattice matching using advanced metallurgical and electrical methods. Double heterojunction injection lasers will be fabricated, their performance evaluated, and growth techniques optimized for long-life room-temperature performance.

SUPPORTED BY U.S. Dept. of Defense, Electronics Research & Development Command, Night Vision & Electro Optics Lab.

4.0043, STUDIES OF THE EQUATORIAL IONOSPHERE AND ATMOSPHERE

D.T. Farley, Cornell University, Ithaca Campus, School of Engineering, Dept. of Electrical Engineering, *242 Carpenter Hall, Ithaca, New York* 14853 (ATM78-12323)

This award funds a program of research leading to a better understanding of the basic physical processes controlling Earth's equatorial ionosphere and atmosphere. The program includes: studies of plasma turbulence in the equatorial electrojet and equatorial F region; measurement of winds and temperature variations in the E region; studies of electric field variations at the equator and how these are related to high latitude phenomena; and studies of radar scattering from the troposphere, stratosphere, and mesosphere.

The experimental work will be carried out at the Jicamarca Radio Observatory located near Lima, Peru. This radar is uniquely situated for equatorial studies; it is also currently the most powerful system in the world for scatter measurements of the upper stratosphere and lower mesosphere.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

4.0044, THEORETICAL STUDY OF IONOSPHERIC IRREGULARITIES AND PLASMA INSTABILITIES IN THE MAGNETOSPHERE

R.N. Sudan, Cornell University, Ithaca Campus, School of Engineering, Dept. of Electrical Engineering, *242 Carpenter Hall, Ithaca, New York* 14853 (ATM78-26770)

This grant funds investigation in the areas of: ionospheric irregularites; triggered Whistler emissions; terrestrial kilometric radiation; and plasma convection.

Turbulence is a key interdisciplinary scientific issue. The ionosphere is one of nature's few examples of rather clean two-dimensional turbulence. This investigation, allowing comparison of ionospheric experience with computation simulation and analytic analysis promises significant progress in this area. The study of triggered Whistler emissions is likewise a study of importance to plasma physics in a much wider context than merely the terrestrial environment. The terrestrial kilometric radiation study, again, is a case of seeking to explain a specific observation in our terrestrial environment, with the underlying motivation of explaining the nature of a more basic wave-particle interaction process. The plasma convection studies, involving strong convection of a finite pressure plasma in a magnetic field driven by thermal and density gradients, should be a valuable theoretical contribution to the understanding of magnetospheric gross behavior.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

4.0045, SCATTERING BY NON-SPHERICAL PARTICULATES (15339-GS)

D.W. Schuerman, State University of New York, Albany Campus, Graduate School, *1400 Washington Ave., Albany, New York* 12203 (DA0F9134; DAAG29-78-G-0024)

To investigate the limits of validity of MIE theory in its application to non-spherical shaped particles. Relevance: Scattering and absorption by randomly oriented non-spherical particles is relevant to investigations of smoke/aerosol obscuration, electro-optical sensor performance under low visibility conditions, remote sensing of atmospheric and terrain parameters, and propagation of the beam of a high-energy laser.

Measure extinction, albedo and scattering matrix of microwave radiation by targets of known shape, size, orientation and refractive properties in the specially designed microwave scattering laboratory. Use an electrodynamic similitude technique to scale from microwave to optical wave.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0046, STABILIZABILITY AND EIGENVALUE STRUCTURE FOR LINEAR SYSTEMS REPRESENTING THE DYNAMICS OF TWIN-LIFT HELICOPTER SYSTEM

C. Martin, Case Western Reserve University, Graduate School, *2040 Adelbert Rd., Cleveland, Ohio* 44106 (NAG 2-82)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

4.0047, CHARACTERIZATION OF HEAT TRANSFER IN CERAMIC COATED INTERNAL COMBUSTION ENGINES (15789-E)

R.G. Murray, Oklahoma State University, School of Arts & Sciences, Dept. of Anatomy & Physiology, *Agricultural Hall, Stillwater, Oklahoma* 74075 (DA0G8962; DAAG29-79-G-0021)

To establish both an in-depth temperature profile data base and a heat transfer model so that design engineers can take full advantage of the potential benefits of insulated ceramic coatings on engine parts. Relevance: This research is directly related to current TARADCOM engine programs such as the high temperature gas turbine and the adiabatic diesel engine.

A series of engine tests are planned that will obtain a temperature profile data base which will consist of C-1 and S-1 operation over a range of fuel-air ratios and compression ratios. Data will be collected for the piston and exhaust valve with two coating thicknesses as well as for non-coated operation. Annand's mathematical model for predicting heat transfer characteristics will be modified to make it applicable for coated operations.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0048, COUPLED WAKE-OSCILLATOR MODELS FOR MISTUNED BLADE FLUTTER

S.H. Johnson, Lehigh University, School of Engineering & Physical Science, Dept. of Mechanical Engineering & Mechanics, *Alumni Memorial Bldg., Bethlehem, Pennsylvania* 18015 (NAG 3-135)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0049, IONIZATION AND AEROSOL PARTICULATES IN THE MIDDLE ATMOSPHERE (15733-GS)

L.C. Hale, Pennsylvania State University, University Park Campus, School of Engineering, Dept. of Electrical Engineering, *101 Hammond Bldg., University Park, Pennsylvania* 16802 (DA0F9252; DAAG29-78-G-0129)

To investigate the processes which determine the electrical structure of the middle atmosphere with emphasis on the electron attachment and detachment processes which control free electron density in the ionospheric D-region. Relevance: The investigation will provide data with which (1) to validate the ASL D-region model used to predict D-region absorption under disturbed atmospheric conditions, (2) to determine absorption effects upon Army communications and BMD systems, and (3) to explain unexpected ballistic target signal enhancement and other phenomena in the D-region.

Use two different types of rocket-launched payloads with newly designed instruments to measure relevant charged-particle properties during undisturbed day and night conditions. Numerical rates will be generated for use in models of the electronic parameters, and information will be sought for the properties of small aerosol particulates in the middle atmosphere.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0050, MEASUREMENT AND DETERMINATION OF MOTOR PARAMETERS FOR DC TRACTION MACHINES AND REVIEW FOR TRACTION MACHINE REPORTS

H.B. Hamilton, University of Pittsburgh, School of Engineering, Dept. of Electrical Engineering, *402 Engineering Hall, Pittsburgh, Pennsylvania* 15213 (DEN 3-196)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0051, EVALUATION OF REFORMED METHANOL AS AN AUTOMOTIVE ENGINE FUEL

T.R. Lalk, Texas A & M University, College Station Campus, School of Engineering, Dept. of Mechanical Engineering, *P.O. Box F E 44, College Station, Texas* 77843 (NAG 3-142)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0052, EVALUATION OF THE GPS SYSTEM AS A CIVIL MARINE NAVIGATION SYSTEM IN THE COASTAL ZONE

R. Rhyne, Texas A & M University, College Station Campus, School of Engineering, Dept. of Electrical Engineering, *P.O. Box F E 44, College Station, Texas* 77843 (R/COE-7)

OBJECTIVES: 1. To continue data collection activities onboard the GYRE. 2. To improve the software systems used onboard the GYRE. Specifically, to develop software whereby the operator can extract the current GPS almanac from the Z-Set and use it to compute daily rise and set times for the current GPS satellite constellation, and software for automatic starting and stopping of the data collection operation. 3. To improve the data analysis software available within the Electrical Engineering Department. Specifically, to provide software to compute

speed and heading from the Z-Set data, to provide plotting capability, to provide 'quick-look' capability, and to provide efficient data archiving. 4. To provide data analysis software for long- and short-term averaging of positional data (LAT, LON, ALT, and CLOCK BIAS) taken when the GYRE is stationary. These averages will identify drifts and biases in the Z-Sets performance. Plotting of these averages will also be provided.

ANTICIPATED BENEFITS: Continued data collection will provide data on the performance of GPS over larger geographic areas, and in comparison to the East Coast LORAN chain. New software will support statistical comparisons of these data, and improve the operation of the data collection system aboard the GYRE.

IDENTIFIED BENEFITS TO DATE: A unique data collection system with GPS, LORAN, OMEGA, and Speed/Heading input has been developed and installed aboard the GYRE. Over sixty hours of data has already been collected and subjected to preliminary processing. This data collection system will allow the relative performance of these various marine navigation systems to be given concrete evaluation.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Sea Grant Office

4.0053, DETERMINE OF THE ROCKET EXHAUST FLOW-FIELD FOR A TIPOFF LAUNCH TUBE

J. Bertin, University of Texas, Austin Campus, School of Engineering, Dept. of Aerospace Engineering, *200 W. 21st, Austin, Texas* 78712 (DA0G2116; H01-80-C-0118)

(1) Obtain additional experimental cold gas for substantiation of the numerical code. (2) Continue development of the numerical computer which will describe the rocket exhaust gas flow in any tube-type launcher.

1. The parameters included in the experimental portion of the program will include (a) nozzle geometry, (b) launcher geometry, and (c) location of nozzle exit plane relative to the launcher features. 2. Three nozzle geometries will be included, two conical and one contoured. 3. Three constant area launch tubes will be included. 4. Tests will be conducted to determine the effects of eroding spin vanes on the launch tube flow-field. 5. Development of the computer code will be continued with probable tasks including multiple shock waves, incorporating real gas effects, and development of flow impingment/reversal model. 6. This work will be done by U. of Texas.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Ground Equipment & Missile Structures Directorate

4.0054, MODULATION AND CODING IN THE SMALL BT REGIME

S.G. Wilson, University of Virginia, School of Engineering & Applied Science, Dept. of Electrical Engineering, *Garrett Hall, Charlottesville, Virginia* 22903 (NAG 3-141)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0055, RANDOM PROBABILITY TECHNIQUES FOR ROCKET MOTOR SERVICE LIFE PREDICTION (TMP149)

R.A. Heller, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Engineering Science & Mechanics, *Blacksburg, Virginia* 24061 (DA0G2506; DAAK40-79-C-0231)

This work intends to develop the models, techniques, and associated computer codes to predict the structural service life of case-bonded solid propellant grains under statistically varying environmental loads using random process analyses.

Models will be developed to include the effects of wind velocity as well as solar radiation and air temperature on the thermal response of rocket grains. Consideration will be given to motor/cannister arrays when subjected to diurnal time and position-dependent solar radiation. Various models for propellant aging and cumulative damage will be considered for inclusion in the service life code. The effect of random vibration loads on a typical case-bonded grain's service life will be analyzed. The possibility of using distribution free methods to describe mechanical property variability will be established.

SUPPORTED BY U.S. Dept. of Defense, Missile Command, Propulsion Directorate

4.0056, INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS SYMPOSIUM ON MECHANICS OF COMPOSITE

C.T. Herakovich, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Engineering Science & Mechanics, *Blacksburg, Virginia* 24061 (NAG 1-128)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

4.0057, QUASI-NEWTON METHODS FOR NONLINEAR STRUCTURAL ANALYSIS AND SYNTHESIS

M.P. Kamat, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Engineering Science & Mechanics, *Blacksburg, Virginia* 24061 (NAG 1-139)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

4.0058, MODELING OF TEMPERATURE AND SUSPENDED SEDIMENT IN THE JOHN H. KERR RESERVOIR, VIRGINIA/NORTH CAROLINA

C.Y. Kuo, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Civil Engineering, *Blacksburg, Virginia* 24061 (NAG 1-123)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

4.0059, LIGHTNING UPSET METHODOLOGY RESEARCH

J.G. Tront, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Electrical Engineering, *Blacksburg, Virginia* 24061 (NAG 1-132)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

4.0060, PROGRAM FOR NONLINEAR STRUCTURAL ANALYSIS

R.E. Jones, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF044560; F49620-79-C-0057)

AF function - aerospace frame and engine structural analysis and design. Deficiency - present techniques for static and dynamic analysis of structures in which nonlinear effects are significant are computationally expensive and functionally inadequate. Objective - to investigate improved finite elements and computer solution algorithms for an important class of nonlinear structural problems. How work contributes - by developing and testing analytic/computational tools (see objective) which allow more realistic models for, and more economical computation of the response of, aerospace structures.

Continuing work started under previous (F44620-76-C-0130) AFOSR support, will develop beam and quadrilateral plate and shell finite elements of the stability type, investigate higher order equation solution algorithms appropriate to nonlinear structural systems, integrate the finite elements and solution algorithms into a prototype/pilot computer code which will incorporate solution-optimizing capabilities such as automatic step-size selection and mesh redefinition, and test and evaluate the resulting tool against both archetypical and representative problems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0061, EVALUATION OF MUDFLOW DAMAGES TO TOUTLE RIVER BY PHOTOGRAMMETRY

M.C. Hou, University of Washington, School of Engineering, Dept. of Civil Engineering, *206 Guggenheim Hall, Seattle, Washington* 98105 (DAR80-21000)

On May 18, 1980, a huge explosion from the top of Mt. St. Helens tossed up a towering wall of volcanic ash that darkened Eastern Washington, ignited scores of forest fires, and set off flash floods that routed hundreds from their homes, covered Spirit Lake, and continued onward into the valley of the North Fork of the Toutle River. Aerial photographs have been made of this disaster and seven targets have been placed on the peak of Mt. St. Helens to be used in the photgrammetric monitoring of this event. This project will provide photographs to be used for a precise photogrammetric survey to determine the total damages, depths of mud deposit, and process of erosion of the existing mud area of the Toutle River, as well as Swift Creek Reservoir, Yale Lake, and Merwin Lake south of Mt. St. Helens.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science, Div. of Applied Research

4.0062, DESIGN STUDY OF HYDRAULIC OUTPUT OF 15 KW STIRLING FREE PISTON ENGINE

M. White, University of Washington, School of Engineering, Dept. of Electrical Engineering, *206 Guggenheim Hall, Seattle, Washington* 98105 (DEN 3-212)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0063, IN-SITU MICROWAVE MEASUREMENTS OF LOSSY DIELECTRICS (15586-GS)

R.J. King, University of Wisconsin, Madison Campus, School of Engineering, Dept. of Electrical & Computer Engineering, *Madison, Wisconsin* 53706 (DA0G8911; DAAG29-80-C-0106)

To develop a simple homodyne system for the measurement of the complex dielectric constant of lossy materials at microwave frequencies. Relevance: This work potentially can lead to development of a nondestructive soil moisture measurement system since the dielectric constant of soils varies as function of moisture content. Soil moisture is a fundamental parameter in hydrologic forecasting and was identified as a needed research area at the recent military hydrology workshop. WES has further identified this as a possible 'ground truthing' system for remotely sensed (aircraft or satellite) data.

Two techniques will be evaluated. In the first, a wave is propagated at right angles into the medium in which a modulated scatterer has been emplaced, thus allowing measurement of the complex plane wave propagation constant. The second technique involves guiding a transmission line mode along the air-medium interface using a bare-ribbon conductor.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0064, MORPHOLOGY AND MOVEMENTS OF POLARIZATION FEATURES

S.S. Limaye, University of Wisconsin, Madison Campus, School of Letters & Science, Dept. of Meteorology, *500 Lincoln Dr., Madison, Wisconsin* 53706 (NAG 2-93)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

4.0065, TURBULENCE STRUCTURE IN UNSTEADY BOUNDARY LAYERS & WAKES IN OSCILLATING AIRFOIL (DA0E9452)

K.C. Hirsch, Universite Libre de Bruxelles, *50 Ave. Franklin Roosevelt, Campus Plaine, Brussels, Belgium* (DA0G3451; DAJA37-80-C-0367)

The objective of the proposed research is to gain more understanding and insight in the turbulence structure of unsteady boundary layers and more particularly in the boundary layers and wakes of an oscillating airfoil. The airfoil is oscillating along an axis parallel to the span located at a quarter-chord from the leading edge, and is of the NACA-0012 type.

Measurements will include mean and periodic sampled velocity profiles as well as all non-zero components of the Reynolds stress tensor in function of position and time in the wake and in the airfoil boundary layers and comparison with the corresponding steady-state values. These measurements will be performed at various incidences, from zero degrees to above stall limit, various amplitudes and frequencies, the reduced frequency (WC/2 UE) varying from .15 to 1.5 and Reynolds numbers up to 3.10 to the 5th power. The experimental procedures are as follows: a rotating slanted hot wire from which mean velocity and re-stress tensor are extracted through a unique micro-processor controled lystem which digitizes and samples the hot wire signals on-line and sends the sampled data either to a magnetic tape or to a computer. This data-handling facility has been especially developed in order to be able to sample 8 simultaneous channels up to 15 kHz each and write them on a magnetic tape. Furthermore, visualization by smoke and tufts will be used.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Research & Standardization Group

4.0066, APPLICATION OF FUNCTIONAL ANALYSIS IN FLUID MECHANICS

L. Napolitano, Universita degli Studi di Napoli, *1 Corso Umberto, Naples, Italy* (DF051250; AFOSR-78-3484)

AF function - aerospace vehicles. Opportunity - future Air Force aerospace vehicles will be required to fly at high speeds and have an ability to maneuver at these speeds with increased efficiency. This will require that new and improved engineering design and analysis methods be developed throughout the total regime for the precise engineering determination of the performance and system capabilities of those vehicles. Objective - this research will attempt to develop new methods for fluid dynamical analysis using high-speed computers, methods which should circumvent the disadvantages of currently employed machine algorithms. How work contributes - the great success of the finite element method in solid mechanical problems will require the application of functional analysis to unify the many treatments in the literature.

This research will systematically apply functional analysis to the development of finite-element techniques for the solution of fluid mechanical problems, thereby unifying the many treatments in the literature that now appear superficially different and framing into a clearly defined context the problems and questions that still remain to be resolved before finite-element methods can be employed rigorously and economically in fluid mechanical analysis.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0067, AN EXPERIMENTAL INVESTIGATION INTO THE AERODYNAMIC OUT-OF-PLANE FORCES ON SLENDER BODIES AT HIGH ANGLES OF ATTACK

B. Hunt, University of Bristol, Dept. of Aeronautical Engineering, *Bristol, England, United Kingdom* (DA0D9348; DAERO 77 G0073)

The objective of the study is to experimentally determine the side forces on slender bodies at high angles of attack.

Extreme care will be taken to establish a steady flow pattern. This will be achieved by the use of rigidly mounted models in low turbulence wind tunnels (the 4 x 3ft tunnel of the Royal Aircraft Establishment, Farnborough) and will be checked by continuously monitoring the time-dependent behaviour of the flow. Pressure distributions will be collected over both the nose and the body of a circular cylinder fitted with a range of sharp and spherically-blunted noses. Tests will be conducted for incidences from 25 percent to 80 percent and for both subcritical and postcritical Reynolds number ranges. The pressures will be integrated to yield side an normal force distributions and the results will be used to improve an existing prediction method and to assist in understanding the flow field.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Research & Standardization Group

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, ULF STUDIES AT THULE, GREENLAND
R.R. HEACOCK, University of Alaska, Fairbanks Campus, Geophysical Inst., *Fairbanks, Alaska* 99701 (DPP78-10539)

A digital fluxgate magnetometer and a fast response riometer will be installed and operated at Thule, Greenland. The data obtained will be used to investigate the coupling of pulsations in the interplanetary magnetic field with the magnetosphere, and to investigate the rate of interplanetary shocks and structure in producing hydromagnetic waves in the magnetosphere.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Polar Programs

5.0002, MAGNITUDE AND VARIABILITY OF SOLAR SPECTRAL IRRADIANCE
G.E. Shaw, University of Alaska, Fairbanks Campus, School of Arts & Sciences, *Fairbanks, Alaska* 99701 (ATM78-12185)

Measurements of the absolute magnitude and variability of solar irradiance from ground stations are being recorded to determine if the sun's visible spectral irradiance is varying with time. The accuracy of the determination is expected to be 1% absolute, the precision (relative change) will be a few tenths of 1%. Because of improved calibration procedures these accuracies and precisions are about 5 times better than existing determinations. Solar variability, if it is observed, will be related to Zurich sunspot number, faculae indices, solar flares and solar magnetic activity. In conjunction with measuring solar variability, aerosol spectral optical data will be collected at Mauna Loa. These data will be related to sources and long-range transport of aerosols accross the Pacific Ocean. Atmospheric ozone will also be studied by absorption of light in the Huggins and Chappuis bands.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

5.0003, GEOLOGICAL STUDIES OF THE GALILEAN SATELLITE
R. Greeley, Arizona State University, School of Liberal Arts, Dept. of Geology, *Tempe, Arizona* 85281 (NAGW 132)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0004, GALILEAN SATELLITE GEOMORPHOLOGY
M. Malin, Arizona State University, School of Liberal Arts, Dept. of Geology, *Tempe, Arizona* 85281 (NAGW 139)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0005, GEOLOGIC INVESTIGATIONS OF IO, GANYMEDE AND CALLISTO
R.G. Strom, University of Arizona, Lunar & Planetary Lab., *Tucson, Arizona* 85721 (NAGW 135)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0006, THE RELAXATION OF CRATERS IN ICE
A. Woronow, University of Arizona, Lunar & Planetary Lab., *Tucson, Arizona* 85721 (NAGW 134)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0007, MULTIWAVE AEROSOL LIDER
R. Schotland, University of Arizona, School of Liberal Arts, Dept. of Atmospheric Sciences, *Tucson, Arizona* 85721 (DN975354; N00014-79-C-0313)

If this atmospheric aerosol remote sensing system can be demonstrated, it will be possible to predict the effects of aerosols on naval electrooptical surveillance and weapon guidance systems.

Two different wavelength LIDARS will be used to show the feasibility of a remote sensing system to determine the effect of aerosols on atmospheric transmissions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0008, CRUSTRAL EVOLUTION OF GANYMEDE AND CALLISTO
E.M. Shoemaker, California Inst. of Technology, Graduate School, Dept. of Geological & Planetary Sciences, *1201 E. California Blvd., Pasadena, California* 91109 (NAGW 138)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0009, VIKING LANDER MAPPING OF THE SURFACE OF MARS
S. Liebes, Stanford University, Graduate School, *Stanford, California* 94305 (NAGW 128)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0010, GEOCHEMICAL AND HIGH-PRESSURE STUDIES OF THE CRUST-MANTLE SYSTEM OF THE EARTH AND OTHER TERRESTRIAL PLANETS
A.L. Boettcher, University of California, Los Angeles Campus, School of Letters & Science, Dept. of Earth & Space Sciences, *405 Hilgard Ave., Los Angeles, California* 90024 (EAR78-16413)

This is a continuation of research supported under NSF grant EAR76-22330. This project involves studies of phase relationships of processes operating in the upper 200 km of the Earth, specifically dealing with the role of volatiles such as H2O and CO2. The approach involves high-temperature, high-pressure experimental studies of lower crust-upper mantle conditions, augmented by studies of the geochemistry of mantle- and crustal-derived xenoliths in alkali basalts and kimberlites. The results will help determine the H2O and CO2 contents of the pristine mantle and of the contaminated mantle ion zones of magma genesis.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Earth Sciences

5.0011, TRANSIENT AND LONG-TERM VARIATIONS IN THE SOLAR WIND
B.J. Rickett, University of California, San Diego Campus, Graduate School, Dept. of Applied Physics & Information Science, *P.O. Box 109, La Jolla, California* 92037 (DF248790; F19628-77-C-0161)

AF function - communications, surveillance, detection, tracking. Deficiency - inadequate knowledge of time and spatial variation of solar wind streams. Objective - to determine short- and long-term variations of solar wind properties as a function of solar latitude and at the earth. How research contributes - forecasts of geomagnetic disturbances due to the impact of high-speed solar wind streams on the geosphere are still unreliable. This research will result in increased knowledge of the spatial-temporal variation of these streams at the earth and hence aid in the prediction of the disturbances that correlate well with adverse effects on AF systems.

The method of determining solar wind speeds from radio scintillation observations will be improved. Solar cycle variations in the latitude dependence of solar wind speed will be analyzed with respect to magnetic field and active region distributions. The effect of flares on the solar wind will be analyzed.

These studies will be collated to provide information on those coronal structures that will result in geophysical effects.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0012, POTENTIAL OF SURFACES IN SPACE
E.C. Whipple, University of California, San Diego Campus, Graduate School, Dept. of Atmospheric Science, *P.O. Box 109, La Jolla, California* 92037 (NAG 3-152)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

5.0013, RESEARCH METHODS TO EXTRACT CLIMATE DIAGNOSTIC RECORDS FROM GEOSYNCHRONOUS SATELLITE DATA
T.H. VonderHaar, Colorado State University, School of Engineering, Dept. of Atmospheric Sciences, *Fort Collins, Colorado* 80523 (ATM78-07148)

Radiation budget measurements are important for long-range weather and climate forecasting because they yield fundamental data related to the energy transport of the atmosphere and ocean. There have been many experiments to make these measurements by satellite over the last fifteen years. They have all suffered because of poor diurnal sampling as most satellites had sunsynchronous orbits. The geosynchronous satellites such as SMS or GEOS now provide an opportunity to take diurnal radiation measurements, but have been of limited use because of the difficulty of recording, processing and archiving the huge amounts of data transmitted by the satellites. The hardware and software needed to overcome this problem are being developed at Colorado State University. A fast micro-processor driven sectorizer is being designed and built to perform regional averaging of radiation data in real time. Concurrently, software is being developed to convert the regional averages into time average reflected and emitted fluxes from the top of the atmosphere. The resulting data will be archived and made available to the scientific community.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

5.0014, LASER TECHNIQUES FOR REMOTE SENSING OF ATMOSPHERIC WINDS (16178-GS)
C.Y. She, Colorado State University, School of Natural Sciences, Dept. of Physics, *Fort Collins, Colorado* 80523 (DA0G0907; DAAG29-80-C-0038)

To develop laser techniques for remote wind sensing with high spatial resolution up to ranges of 1,000 meters. Relevance: Remote wind speed measurements are highly relevant to missile ballistics, tank gun fire, propagation of high energy lasers, transport and diffusion of screening smokes and chemical agents, and other activities.

Field measurements will be made at the NOAA Table Mountain facility in Boulder, Colorado using both the crossed dual-beam laser Doppler velocimeter and the parallel dual-beam laser time-of-flight velocimeter for (1) further confirmation of the concept of single-particle scattering, (2) evaluation of new information regarding the shape of the measured correlation function, (3) interpretation of the effects of atmospheric turbulence, (4) analysis of performance in the presence of dense smoke, dust, and a variety of weather conditions, and (5) comparison with conventional anemometer wind measurements.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

5.0015, INTERPLANETARY DUST - OPTICAL AND PHYSICAL PROPERTIES AND DYNAMICS
J.L. Weinberg, State University System of Florida, University of Florida, Graduate School, *Gainesville, Florida* 32611 (NAGW 126)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0016, SEA-AIR EXCHANGE (SEAREX) - PHYSICAL ASPECTS OF SEA-AIR EXCHANGE BUBBLES AND SPRAY
E.B. Kraus, University of Miami, D.H. & Lewis Rosenstiel School of Marine & Atmospheric Sci., Dept. of Atmospheric Sciences, *4600 Rickenbacker Cswy., Coral Gables, Florida* 33149 (OCE79-14616)

The SEAREX project is a multidisciplinary study of materials transport across the air-sea interface. Investigators will test the hypothesis that a major fraction of pollutants introduced to the ocean and atmosphere is removed by particle scavenging. Sampling stations at Eniwetok in the North Pacific and American Samoa in the South Pacific provide equatorial coverage of a major ocean away from human activities. Aerosol compositions will be measured at these stations, and estimates will be made of net transport to the ocean during times covering both wet and dry seasons. Results from these studies will provide the first measures of fluxes of substances representative of the uncontaminated marine atmosphere. Sources of these substances will be determined and processes controlling their exchange across the air-sea interface will be studied.

The SEAREX project is conducted by investigators from ten research institutions as follows: University of Rhode Island, California Institute of Technology, Centre National de la Recherche Scientifique, Yale University, Woods Hole Oceanographic Institution, Texas A & M University, University of Miami, University of Connecticut, University of Illinois and the University of East Anglia. Coordination with GAMETAG (Global Atmospheric Measuring Experiments on Tropospheric Aerosols and Gases) will continue.

This award supports studies of bubbles and spray in various sea states and their role in the production of sea-salt aerosols. Measurements will be made of number density, size, residence time, displacement from the surface and changes in the near-surface aerosols. Additional meteorological support will be provided by this award using information from weather satellites.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Ocean Sciences

5.0017, VOLATILE EVOLUTION
F. Fanele, University of Hawaii System, Manoa Campus, School of Arts & Sciences, Dept. of Geology & Geophysics, *2444 Dole St., Honolulu, Hawaii* 96822 (NAGW 133)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0018, LONGITUDINAL ASYMMETRIES ON CALLISTO AND EUROPA
C.B. Pilcher, University of Hawaii System, Manoa Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *2444 Dole St., Honolulu, Hawaii* 96822 (NAGW 136)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0019, PARAMETERIZATION OF CUMULUS CONVECTION AND RELATIVE EFFECTS OF CLOUDS
H. Kuo, University of Chicago, School of Physical Sciences, Dept. of Geophysical Sciences, *5734 S. Ellis Ave., c/o Hinds Geophysics Lab., Chicago, Illinois* 60637 (NAG 5-129)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0020, DEVELOPMENT OF ALGORITHMS FOR WIND DIRECTION AMBIGUITY REMOVAL

K.S. Shanmugam, University of Kansas, Lawrence Campus, Graduate School, *214 Strong Hall, Lawrence, Kansas* 66044 (NAG 1-117)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

5.0021, MEASUREMENT OF THE THERMODYNAMICS OF THE SOMALI JET BY HIGH-RESOLUTION RADIOSONDINGS

J.M. Coleman, Louisiana State University, Agricultural & Mechanical College, Coastal Studies Inst., *University Station, Baton Rouge, Louisiana* 70803 (ATM78-13388)

The objective of this research is to study the thermodynamic structure of a rapidly moving, low level, atmospheric jet stream called the Somali jet. This jet stream of air crosses the equator over the Indian Ocean, flows north along the east coast of Africa and then northeastward across the Arabian Sea towards India where it is known as the 'southwest monsoon.' It is in part responsible for providing the thermal energy and moisture for the intense monsoon rains that fall over India and southeast Asia during the summer.

This project will consist of setting up three upper-air observing stations in Somalia to monitor the temperature, moisture and winds within the Somali jet. It will be carried out in conjunction with a related Florida State University program. The data will be analyzed with the research objective of studying the time evolution of the structure of the jet in relation to the pre-, onset- and active-monsoon periods.

This project is a part of the GARP Monsoon Experiment (MONEX). MONEX is a major study to increase our knowledge and understanding of the dynamics and thermodynamics of the atmosphere and ocean in monsoon regions. It is important scientifically and also has significance for global agriculture, economics and politics. The initiative for MONEX is from the Government of India with the U.S.S.R. and U.S. playing major roles. In addition to the benefits mentioned above, MONEX offers an excellent opportunity for scientific and technical cooperation between, and of mutual benefit to, the U.S., India and the U.S.S.R.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

5.0022, PIEZOELECTRIC ACCELEROMETER FOR SPACE SHUTTLE TEST

D.H. Fryklund, Accumetrics Corp., *Cambridge, Massachusetts* (DF583520; F19628-79-C-0095)

AF function - airborne surveillance, target acquisition. Deficiency - atmospheric density variations with time and space cannot be predicted with sufficient accuracy. Objective - direct measurement of atmospheric density by satellite-borne accelerometers. Correlation of these results is made with other satellite data and with solar-geophysical parameters to develop improved atmospheric models. How research contributes - permits accurate determination of Air Force satellite ephemerides and development of accurate density forecasting techniques.

A satellite triaxial piezoelectric accelerometer will be designed, fabricated, tested and calibrated. The instrument will be flown on one of the space transportation system orbital flight tests. The purpose of the instrument is to provide information on the orbital acceleration environment. In addition to monitoring the magnitude and frequency distribution of onboard generated accelerations, aero-dynamic drag effects will be measured. Atmospheric density is directly proportional to drag. NASA has modified the flight test timeline to turn the instrument on during periods of interest to AFGL.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0023, PI2 PULSATION STUDY

W.J. Hughes, Boston University, School of Liberal Arts, Dept. of Astronomy, *755 Commonwealth Ave., Charles River Campus, Boston, Massachusetts* 02215 (DF583960; F19628-80-C-0025)

AF function - systems for command, control, communications and detection. Deficiency - performance degrades and becomes unreliable during intervals of severe magnetic activity. Methods to characterize and predict this activity are required. Objective - to understand how pi2 signals propagate from their source region in the auroral zone to mid-latitudes. How development contributes - knowledge of the relationship between mid-latitude pi2's and their source will increase their potential as a diagnostic tool for magnetospheric activity, particularly substorms.

This amendment increases the total value of the requested contract and provides for an increased level of effort to include studies of pulsation data from the ISEE spacecraft and from the United Kingdom Institute of Geological Sciences' magnetometer network.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0024, TESTING OF LASER REMOTE SENSING

A. Mooradian, Massachusetts Inst. of Technology, Lincoln Lab., *244 Wood St., Lexington, Massachusetts* 02173 (NAGW 102)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space & Terrestrial Applications

5.0025, WIND TUNNEL GERDIEN SHOCK WAVE STUDIES

M. Finston, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF582600; F19628-79-C-0059)

AF function - communication and radar survivability of Air Force systems such as AABNCP, AWACS, BMEWS, OTH-B and DSP under naturally disturbed and nuclear environments. Deficiency or opportunity - total ion species concentrations are required to improve models that will predict VLF to VHF radar and communications propagation characteristics during quiet and disturbed atmospheric conditions. Objective - accurate calibration of rocket-borne Gerdien condensers used to measure total charge density. How research contributes - accurate total ion density measurements depend on careful calibration of the mass flow through the Gerdien condenser under simulated flight conditions. The Gerdien data together with the mass spectrometer relative ion species concentration data will be used to determine absolute ion species concentrations to be used for model inputs.

Calibration data on the Gerdien will be obtained using the Arnold Engineering Development Center 10V-chamber. Mass flow calibration and boundary layer growth along the vehicle will be studied at high-density altitudes (70 km to 90 km) and Mach numbers from 3.0 to 3.5.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0026, SATELLITE ELECTRON BEAM SYSTEM

W. Huber, Tri Con Associates Inc., *Cambridge, Massachusetts* (DF243520; F19628-75-C-0114)

AF function - operational satellites. Deficiency - electrical charging of satellites may cause interruption or failure of electronic components of the satellite. How research contributes - development and flight of an electron beam system to induce controlled electrical charging. By simulating satellite charging the effects on a satellite of being charged while in orbit can be determined. The extent and nature of deleterious effects on electronic equipment can be studied.

A system will be built to enable the controlled ejection of high energy electrons from a satellite. An electron beam successfully used on a number of rocket experiments will be the source of the electrons. The current, energy, and duty cycle of the ejected electron beam will be variable, and will be controlled by ground commands. The beam current will be variable

from 100 nanoamperes to a milliampere, the range of energies will extend from .5 to 3 keV and the duty cycle extend from .01 percent to continuous. The specifications now call for the entire system, exclusive of batteries, to weigh 5 pounds, to be contained in a volume of less than 200 cubic inches, to operate from batteries supplying from 20 to 40 volts, and to use less than 15 watts at maximum beam power.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0027, REFURBISH ULTRAVIOLET SPECTROMETERS
C.G. Kuczun, Tri Con Associates Inc., *Cambridge, Massachusetts* (DF580570; F19628-78-C-0043)

AF function - vehicle tracking during flight and reeentry, trajectory prediction, communication systems. Deficiency - present atmospheric models predict only slight variability of the density of the upper atmosphere below 200 km, however, empirical data show this conclusion to be incorrect and observations indicate density changes as great as 50 percent in both space and time at altitudes between 120 and 200 km. This altitude region important for Air Force operations, will be studied on a world-wide basis by density experiments aboard the DMSP satellites. The present work will support these experiments. Objective -in-situ measurements with rockets of atmospheric parameters to provide correlative data for comparison with photometric data from DMSP satellites. How research contributes - provides direct, low-altitude measurements of pertinent atmospheric properties as an aid in understanding the remote optical measurements made from DMSP satellites.

Contractor shall refurbish two rocket ultraviolet spectrometers recovered from previous rocket flights and provide field engineering services required to prepare four such spectrometers for future rocket flights. With these rocket payloads measurements will subsequently be made of the photoelectron flux and differential energy distribution for energies between 0 and 100 electron volts, of the radiance of nitrogen airglow at 3371 angstroms and of the density and composition of the upper atmosphere as established by solar ultraviolet photon absorption rates. All measurements will be made from a single rocket payload in the altitude range between 120 and 200 km.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0028, DESIGN OF AEROSPACE EXPERIMENTAL INSTRUMENTS
R. Ebacher, Wentworth Inst. of Technology, Undergraduate School, *550 Huntington Ave., Boston, Massachusetts* 02115 (DF580010; F19628-78-C-0017)

AF function - military operations of the B-1, F-15 and other AF vehicles in the stratosphere, nuclear weapons delivery, communications, detection, track, and intercept. Deficiency - environmental effects of AF stratospheric operations cannot be predicted because of a lack of stratospheric data. Further, mixing and chemical effects of jet engine or missile effluents are only poorly defined. Also, inability to forecast upper atmosphere interactions affecting the design and operation of military systems such as reentry vehicles, over-the-horizon radar, polar communications and satellite ephemerides. Research -design, test and provide quadrupole mass spectrometers and gas sampling hardware with associated support equipment to be used in rocket and balloon-borne experiments. Cryogenic, vacuum, and contaminate-free technologies are used. How research contributes - establish stratospheric standards and criteria by period insitu and laboratory gas analysis and provide data for upper atmospheric assessment models by measurement of neutral and ionized species.

Consultation between experimenters and mechanical designers to include review of mechanical designs and monitoring the fabrication, delivery of prototype instruments, testing in flight configurations, design, updates, if necessary. Designers may be required to operate instruments during field experiments.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0029, BERYLLIUM ISOTOPES IN METEORITES
G.F. Herzog, Rutgers the State University of New Jersey, New Brunswick Campus, Graduate School, *Old Queens Bldg., New Brunswick, New Jersey* 08903 (NAGW 142)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0030, NAVY ENVIRONMENT - TIDAL GRAVITY INVERSION
J.T. Kuo, Columbia University, Lamont Doherty Geological Observatory, *Palisades, New York* 10964 (DN223188; N00014-75-C-0605)

This research is to predict ocean tides at any point in the world's oceans with emphasis on accurate predictions along shorelines. Tides and tidally induced currents significantly affect amphibious operations, mining implants, ship routing, sea-floor construction, and ship operation in shallow coastal waters,. as well as producing internal waves and significant currents even in the open oceans where they impact submarine operation as well as acoustic propagation. The empirical data is necessary for providing constraints to classical tide predictions and satellite altimetry analysis.

In preparing for eventually mapping tides on a worldwide open ocean basis, this research is establishing criteria for selecting the location of ocean-bottom tidal stations. Gravity tidal stations will be established at appropriate sea-floor stations and at land-based stations overseas. The geophysical ocean-bottom instrument (GOBI) gravimeter will be designed for making deep-ocean measurements.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0031, COLLISIONALLY INDUCED SHARP FEATURES IN THE VIBRATION-ROTATION SPECTRUM OF HO
R.M. Herman, Pennsylvania State University, University Park Campus, Materials Research Lab., *Research Center, Room 212, University Park, Pennsylvania* 16802 (NAGW 127)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

5.0032, OBSERVATIONS OF TOPOGRAPHIC ROSSBY WAVES AND GULF STREAM MEANDERS ALONG THE CONTINENTAL SLOPE
D.A. Brooks, Texas A & M University, College Station Campus, School of Geosciences, Dept. of Oceanography, *College Station, Texas* 77843 (OCE79-06710)

This project, which involves field observations and data analysis, is designed to study topographic and meteorological forcing of observed meanders of the Gulf Stream along the continental slope south of Cape Hatteras, North Carolina. A field study consisting of four-month long winter and summer mooring periods will examine the detailed structure and time history of the current and temperature fluctuations along the continental slope off North Carolina. Vertical and cross-slope structure and along-shore propagational characteristics will be determined. Correlation of the current and temperature data with wind data, and comparison of direct current data with satellite imagery of sea-surface temperature patterns will be done to investigate the possibilities of wind or lee-wave forcing. Field data will be compared with theory to assess the importance of stable topographic Rossby wave propagation and instability processes in the Stream. This is a three-year project with the field work occurring during the first and second years. The first year of the study was supported by NSF Grant Number ICE77-25682 to North Carolina State University at Raleigh.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Ocean Sciences

5.0033, ABSORPTION OF HUMIC ACIDS AND TRACE METALS IN NATURAL WATERS
W.H. Leung, Hampton Inst., Graduate School, Dept. of Physical Sciences, *Hampton, Virginia* 23368 (NAG 1-122)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

5.0034, INVESTIGATION OF A PATTERN CLASSIFICATION APPROACH FOR WIND STREAMLINE DIRECTION AMBIGUITY REMOVAL
J.W. Stoughton, Old Dominion University, School of Engineering, Dept. of Electrical Engineering, *5201 Hampton Blvd., Norfolk, Virginia* 23508 (NAG 1-111)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

5.0035, STRUCTURAL-STATISTICAL APPROACHES TO ANALYSIS OF MACROTEXTURES
R.M. Haralick, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Electrical Engineering, *Blacksburg, Virginia* 24061 (NAG 5-131)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0036, TIME DEPENDENT TURBULENT BOUNDARY LAYERS IN TIDAL FLOWS
J.D. Smith, University of Washington, School of Arts & Sciences, Dept. of Oceanography, *Seattle, Washington* 98105 (OCE78-20452)

This project is a combined field measurement and analysis effort to study the bottom boundary layer in a shallow, well mixed estuary. Special emphasis will be given to the time dependence which results from the fluctuating tidal currents. The assumptions used for determining kinematic shear stress and roughness length from velocity profiles will be investigated for depth-limited, time-dependent boundary layers. Shear stress and roughness length are important parameters in estuarine mixing and tidal circulation models; these parameters are also critical in the estimation of sediment transport rates.

It is proposed to measure the velocity profile and Reynolds stress field with small impeller meters to test the assumption of a uniform stress layer. Independent evaluation of kinematic stress will be obtained from the energy dissipation rate. Turbulence measurements will be obtained to examine the local equilibrium by direct measurement of production and dissipation. A hot-film probe, in a probe washer, will be used to measure the high frequency fluctuations.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Ocean Sciences

5.0037, DEVELOPMENT OF AN ALGORITHM FOR REMOVAL OF DIRECTIONAL AMBIGUITY FROM MICROWAVE SCATTER SURFACE WIND MEASUREMENTS
B.B. Hinton, University of Wisconsin, Madison Campus, School of Letters & Science, Dept. of Meteorology, *500 Lincoln Dr., Madison, Wisconsin* 53706 (NAG 1-118)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

5.0038, NEW MATHEMATICAL METHODS FOR VOCATIONAL OBJECTIVE ANALYSIS OF METEOROLOGICAL INFORMATION
G. Wahba, University of Wisconsin, Madison Campus, School of Letters & Science, Dept. of Statistics, *500 Lincoln Dr., Madison, Wisconsin* 53706 (NAG 5-128)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0039, PHASE AND AMPLITUDE SCINTILLATION AT THE EQUATOR
D. Yeboah Amankwah, University of Ghana, *P.O. Box 4236, Accra, Ghana* (DF582150; AFOSR-78-3516)

AF function - communications, radar. Deficiency - signal fading increases error rates in communications, radar range errors. Objective - to predict effects of the equatorial ionosphere and signals transmitted by satellites. How research contributes - predicts and minimizes ionospheric related outages. This work continues observations in Ghana of suitable satellite signals and enables scientific analyses which integrate various geophysical parameters and searches for causative relationships.

VHF and UHF signals from ATS, GOES and MARISAT spacecraft will be continuously recorded. TEC and scintillation parameters will be computed and related to elevation angle effects. Measurements will continue on 136 MHz scintillation, as well as 257 MHz, and any higher frequency beacons that may become available. The possibility of microwave measurements is being considered. Faraday measurements will continue as long as a suitable satellite is available. GOES 1 was used until its beacon was switched off. ATS-5 is currently being used, and GOES 2 is also a possibility should ATS-5 move or be switched off. The present rather extensive data will be used to complete a study of the equatorial evening minimum (EEM), and to continue the study of the dependence of scintillation on elevation, frequency and longtitude. This work supports GPSCS/SSS and GPS/NAVSTAR.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, COMPUTER-BASED LANDING SIGNAL OFFICER CARRIER AIRCRAFT RECOVERY MODEL
G. Borden, Human Performance Research Inc., *616 Carlo Dr., Goleta, California* 93017 (DN894013; N61339-77-C-0110)

In support of development of a trainer for landing signal officers (LSO), a study is required to expand a laboratory-developed preliminary model of ideal LSO 'waving' behavior to include precautionary and advisory calls. The model will be used to judge performance of student LSOS during training.

Initial model bases power and waveoff calls (EMCON model) on three approach parameters. Expanding number of monitored parameters and degree of approach segmentation will allow all NATOPS calls to be generated.

SUPPORTED BY U.S. Dept. of Defense, Naval Training Equipment Center, Human Factors Lab.

6.0002, WINDBLAST PROTECTION CONCEPTS DEMONSTRATION
W. Adams, Rockwell International Corp., *International Airport, Los Angeles, California* (DF325420; F33615-79-C-0528)

Injury statistics from combat and non-combat emergency escape experience with USAF and USN ejection seats indicate that windblast injuries greatly degrade the effectiveness of these systems to provide safe recovery of aircrew. Injuries to the legs and arms present the most frequent serious problem. The objective of this research effort is to develop and demonstrate by limited testing the feasibility of limb protection concepts that are suitable for use with current inservice ejection seats. Resulting aeromedical design criteria and data will be provided to the Aeronautical Systems Division for the further development and testing, and introduction of the final windblast protection equipment into operational usage.

This research effort encompasses: 1. Exploratory development of new windblast protection techniques and equipment configurations, 2. demonstration of protective equipment concepts by laboratory tests, and 3. the development of aeromedical design criteria for windblast protection systems. To assure applicability of the research effort, the ACES II ejection seat will be used as the baseline seat design for this study. The protective system design will be compatible with the general installation requirements of the A-10, F-15, F-16 and their two-seat configurations. Consideration of designs from Air Force contract

F33615-78-C-0514 will be given greatest emphasis. The research effort will be coordinated with the ASD Life Support Systems' program office and aircraft program offices to assure that the design data and criteria that are developed can be successfully transitioned into protective-equipment hardware-development programs that will meet operational user needs.

SUPPORTED BY U.S. Dept. of Defense, Aerospace Medical Research Lab., Biodynamics & Bionics Div.

6.0003, SUPPORTING STUDY FOR ELECTRON MICROSCOPY, ELECTROMYOGRAPHY AND PROTEASE ACTIVITY OF RAT HIND MUSCLES

D.A. Riley, University of California, San Francisco Campus, School of Medicine, Dept. of Anatomy, *551 Parnassus Ave., San Francisco, California* 94122 (NAS 2-10816)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0004, EXPLORATION OF EVOLUTIONARY HISTORIES LEADING TO COMPLEX LIFE

J.W. Valentine, University of California, Santa Barbara Campus, School of Letters & Science, Dept. of Biological Sciences, *Santa Barbara, California* 93106 (NAG 2-73)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0005, PERSONNEL TECHNOLOGY - PARAMETERS OF VISUAL SEARCH CAPABILITY

J.E. Hoffman, University of Delaware, School of Arts & Sciences, Dept. of Psychology, *Newark, Delaware* 19711 (DN875565; N00014-78-C-0762)

Many Navy and Marine Corps jobs (e.g., flying) require rapid and efficient visual search at the same time as other information-processing tasks. This work is concerned with the extent to which such search tasks interfere with other visual and auditory tasks, and vice-versa. Specific objectives are to formulate a stage model of search, determine how speed and automaticity of search develop in search tasks, and identify the best predictors of an individual's capacity to develop such automaticity.

Experiments are being conducted to determine the power of a performance operating function derived from one dual task to predict performance in a second dual task. These dual tasks will require subjects to simultaneously perform two of the following tasks: visual search, visual flicker location, visual symbol orientation. General time-sharing ability and individual differences will be evaluated by experiments that include auditory as well as visual task components. The nature of time-sharing resources will be analyzed within the context of a processing stage model.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

6.0006, RELATIONSHIP OF ANGIOTENSIN RHYTHMS IN PLASMA AND CNS TO NEUROGENIC HYPERTENSION

M.S. Holder, State University System of Florida, Florida Agricultural & Mechanical University, School of Pharmacy, *Tallahassee, Florida* 32307 (NAG 2-81)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0007, INVESTIGATIONS ON THE PRINCIPLES OF ZOOGEOGRAPHY

J.C. Briggs, State University System of Florida, University of South Florida, School of Natural Sciences, Dept. of Biology, *4202 Fowler Ave., Tampa, Florida* 33620 (NAG 2-74)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0008, ROLE OF GRAVITY IN LEAF-BLADE FORM

A.B. Hayes, Loyola University of Chicago, Chicago Campus, School of Arts & Sciences, Dept. of Natural Science, *820 N. Michigan Ave., Chicago, Illinois* 60611 (NAGW 131)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

6.0009, DETECTION OF MOTION UNDER TARGET UNCERTAINTY AND PERIPHERAL PRESENTATION

R.W. Sekuler, Northwestern University, Evanston Campus, School of Arts & Sciences, Dept. of Psychology, *633 Clark St., Evanston, Illinois* 60201 (DF055300; F49620-79-C-0088)

AF function - among the most critical functions subserved by human vision is the perception of visual targets. Prompt and accurate detection of targets is an essential requirement for the effectiveness of critical Air Force missions. Deficiency - two factors prevent extrapolation of laboratory studies to field conditions - (1) there is little or no uncertainty concerning characteristics of targets to be detected, and (2) most studies of motion perception have used targets presented only in the central position of the visual field, while moving-target detection depends a great deal upon the periphery of the field. Objective - the research will examine the way in which the visibility of moving targets is affected by prior knowledge of the target's speed and/or locus in the visual field. Motion perception in the periphery of the visual field will be examined, and possible individual differences in motion sensitivity will be explored. Air Force pilots will be used as subjects to measure sensitivity both to moving low spatial frequency gratings and to direction of target motion. Pilot data will be compared to previously measured control group data in an attempt to identify those spatio-temporal capacities that distinguish skilled pilots from others. How research contributes - research results will have important implications for Air Force modeling and prediction of target acquisition performance under uncertainty conditions and may aid also in the selection of pilot trainees.

During the first year, studies will be undertaken to - (1) determine the possibility of reducing the effect of uncertainty by informational prompts, (2) measure the time-course of effect of uncertainty-reducing informational prompts, (3) determine the magnitude of uncertainty effects in peripheral and central regions of the visual field, (4) determine the correlation between susceptibility to Fraser's movement illusion and other visual abilities as an initial step towards individual differences components in motion perception, and (5) compare the visual capacities of pilots to control observers using discriminant analysis.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0010, DEVELOP NOISE-CHECK TECHNOLOGY FOR MONITORING AIRCRAFT NOISE

D.E. Bishop, Bolt Beranek & Newman Inc., *50 Moulton St., Cambridge, Massachusetts* 02138 (DF322710; F33615-77-C-0514)

A vital part of Air Force environmental noise planning efforts is the need to perform spot-check noise measurements which provide data supporting predicted noise exposure values and the corresponding decisions made regarding land use compatibility and environmental noise impact. The objective of this contract is to develop the aircraft noise monitoring technology needed by Air Force personnel to collect field-measured noise exposure data acceptable as evidence in cases involving extreme controversy or litigation.

The contractor will review the present state-of-the-art in aircraft noise monitoring technology. He will develop specific procedures and instrumentation requirements for use by Air Force personnel in collecting noise exposure data able to withstand the closest technical scrutiny. The contractor will demonstrate the adequacy of the proposed AF noisecheck methodology by performing an actual field application study at an AF airbase. Refinements in noisecheck will be made after analysis of the data from the field application study.

SUPPORTED BY U.S. Dept. of Defense, Aerospace Medical Research Lab., Biodynamics & Bionics Div.

6.0011, COMPUTER-BASED INTERACTIVE FLIGHT TRAINING

W. Feurzeig, Bolt Beranek & Newman Inc., *50 Moulton St., Cambridge, Massachusetts* 02138 (DF052190; F49620-78-C-0066)

AF function - this research impacts future AF aircrew training programs. Deficiency - continued flying hour curtailments and projected restrictions on aircrew training as we know it today require the development of innovative training technologies for the future. Better performance measurement algorithms are needed and more optimal use of computer-based training for transition and continuation training programs in flight simulators is required. Objective - this research will investigate computer-implemented algorithms as a new approach to flight performance analyses expressely designed for interactive application in computer-based simulators. How research contributes -more effective aircrew training in flight simulation devices should occur as a result of this research.

This research employs state-of-the-art semantic representation and pattern recognition methods for extracting significant features of task performance by the aircrew member. Knowledge of the methods used by expert instructors in analyzing task performance and malperformance behaviors will be used in procedures for parsing flights, defining segments and transitions, recognizing and characterizing errors and error patterns, diagnosing underlying trainee difficulties, and prescribing remedial training tasks to overcome task difficulties. The Orly simulator will be used for data collection from expert instructors. Instructor models will be created to determine ways of generating diagnostic and prescriptive procedures for the trainee.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0012, THE EARLIEST OCCURRENCE AND EVOLUTIONARY DEVELOPMENT OF MICROBIAL ENDOLITHS

S.E. Campbell, Boston University, School of Liberal Arts, Dept. of Biology, *755 Commonwealth Ave., Charles River Campus, Boston, Massachusetts* 02215 (NAGW 141)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

6.0013, TOTAL IN-FLIGHT SIMULATOR (TIFS) PRECEPTION STUDY

J. Borah, Gulf & Western Industries Co. Inc., Applied Science Laboratories, *335 Bear Hill Rd., Waltham, Massachusetts* 02154 (DF228760; F33615-78-C-0062)

To obtain quantitative data on spatial orientation perception during certain standardized aircraft maneuvers. Secondary objectives are concerned with documenting the force and tactile cue environment and to record the biomechanical reactions involved in head movements of active and passive pilots during such maneuvers. The data will also be used to validate the human sensory mechanism model. Contract no. F33615-76-C-0039.

The AFFDL total in-flight simulator (TIFS) will be instrumented to yield spatial orientation perception data, tactile cue data and head movement data. Standardized maneuvers will be flown and time-histories of aircraft angular rates, specific forces, and Euler angles will be recorded. Dan McGuire is co-monitor.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0014, CARBON DEPOSITION IN THE BOSCH PROCESS WITH RUTHENIUM AND RUTHENIUM-IRON ALLOY CATALYSTS

R.C. Reid, Massachusetts Inst. of Technology, School of Engineering, Dept. of Chemical Engineering, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAG 2-90)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0015, BIODYNAMIC RESPONSE

A.I. King, Wayne State University, School of Engineering, Dept. of Mechanical Engineering, *5950 Cass Ave., Detroit, Michigan* 48202 (DN123393; N00014-75-C-1015)

For the purpose of minimizing pilot injury, experimental and analytical techniques are being used to study the biodynamic response of naval pilots when subjected to parachute opening or ejection shock.

Using various experimental procedures, the motion of the cervical spine will be determined during static loading of cadavers during simulated inertial loading. Further experimental techniques will be developed to assist in understanding injury mechanisms for indirect loading on the cervical area. Other work will continue on the development of physical and mathematical models of the neck as well as an evaluation of the effective restraint systems on the head/neck region.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

6.0016, PLASMA CATECHOLAMINES AND HUMAN PERFORMANCES

B.H. Natelson, U.S. Veterans Admin., Dept. of Medicine & Surgery, Medical Center, *Tremont Ave. & S. Centre St., East Orange, New Jersey* 07019 (146-30-9736; 561-007-I)

Bedrest is the only way of producing, on earth, the physiological changes that accompany the weightlessness found in space. NASA is anxious to find any visceral variable that will predict whether a subject will decondition rapidly or not. We have collected plasma samples from men at bedrest to analyze for catecholamines and cortisol. Since norepinephrine especially is an index of sympathetic nervous activity, we are hopeful that our hormonal measurements will serve as a predictor of who will suffer the most rapid cardiovascular deconditioning.

SUPPORTED BY U.S. Veterans Admin., Dept. of Medicine & Surgery

6.0017, THE DESCRIPTIVE ECOLOGY AT HYDRA - TOWARD A TEST CORE FOR ECOLOGICAL PREDICTION

L.B. Slobodkin, State University of New York, Stony Brook Campus, Marine Sciences Research Center, *Stony Brook, New York* 11790 (NAGW 144)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

6.0018, F-16 SIMULATED AIRCRAFT MAINTENANCE TRAINER EVALUATION

R. Hritz, Applied Science Associates Inc., *P.O. Box 158, Valencia, Pennsylvania* 16059 (DF224580; F33615-80-C-0013)

The objective of this effort is to perform a comprehensive cost/training effectiveness evaluation of selected F-16 simulated aircraft maintenance trainers (SAMTS). These prototypical SAMTS will be used for organizational level maintenance training by the ATC Field Training Detachment at Hill AFB, Utah. Additionally, this study will provide recommendations for future efforts in the area of maintenance training simulation evaluations.

A two-phase approach is planned. During phase I, familiarization with the F-16 SAMT and the training environment will be accomplished, along with the construction of the specific evaluation paradigm and all necessary data collection instruments. During phase II, student performance and cost data will be collected. Student performances will be collected on the simulation of the actual equipment where feasible and will be contrasted with pre-defined criterion standards. Cost data will necessarily have to be compared to hypothetical cost models or models of maintenance simulation from other aircraft. Additionally, subjective attitudinal information will be gathered from instructors and students.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0019, INFLUENCE OF SUSPENSION-HYPOKINESIA ON SKELETAL MUSCLE
G.H. Templeton, University of Texas, Health Science Center at Dallas, Southwestern Medical School, Dept. of Physiology, *5323 Harry Hines Blvd., Dallas, Texas* 75230 (NAGW 140)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

6.0020, DEVELOPMENT OF TECHNIQUES FOR SIMULATION OF AIR-TO-AIR COMBAT STRESS SITUATIONS ON THE DYNAMIC ENVIRONMENT SIMULATOR
T. Egar, Quest Research Corp., *6845 Elm St., Suite 47, McLean, Virginia* 22101 (DF314910; F33615-72-C-1150)

The effect of the environment (notably G stress) on the pilot has a crucial but as yet inadequately measured effect on pilot performance in the air-to-air combat situation. A man-rated closed-loop motion simulation facility capable of recreating realistic maneuvering G-stresses is required for dynamic simulation studies of pilot performance on tasks such as the gun-laying problem. At the present time, AMRL/EM, is adapting the dynamic environmental simulators to provide this capability in support of project 431A. The objective of this effort is to further develop the mathematical basis for the simulation of specific mission stress environments applicable to air-to-air combat and air-to-ground gunnery problems.

Under this effort, the fundamental solution of simulation problems involved in simulations of this nature will be examined exhaustedly from the standpoint of mathematical considerations and hardware requirements. The mathematical considerations involved include the solution of target and chase aircraft position in (three) space considerations regarding coordinate conversion problems involved in simulating air-to-ground gunnery as well as an investigation of all of the compatibility and interfacing requirements necessary to the efficient and realistic simulation of these types of problems.

SUPPORTED BY U.S. Dept. of Defense, Aerospace Medical Research Lab., Environmental Medicine Div.

6.0021, MUSCLE FIBER TYPE DISTRIBUTION RELATIVE TO MUSCLE WEAKNESS - A NEW METHOD
S. Ellis, University of Washington, School of Arts & Sciences, Dept. of Physics, *Seattle, Washington* 98105 (NAG 2-80)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0022, LUNG METABOLISM, FUNCTION AND MORPHOLOGY DURING HYPEROXIC AND HYPERBARIC EXPOSURE
J.A. Will, University of Wisconsin, Madison Campus, School of Agriculture & Life Sciences, Dept. of Veterinary Science, *Agriculture Hall, Madison, Wisconsin* 53706 (DF051220; AFOSR-78-3497)

AF function - Air Force operating environments expose personnel to a wide variety of environmental stresses and potential hazards. These stressors are frequently experienced in combination with each other and with other factors such as high human operator work loads and mechanical forces. The use of elevated concentrations of oxygen is probably the most important single factor in the development of atalectasis in pilots of high performance aircraft. Aviators breathing pure oxygen at reduced pressures are particularly susceptible to absorptional atalectasis and often experience this condition during a breathhold or when airway obstruction occurs during exposure to acceleration. Exposure of man to pure oxygen even at normal atmospheric pressure rapidly alters lung function and may cause pulmonary damage. Deficiency - the potential complications of chronic oxygen administration to aircrew members is an area that must be investigated. The proposed relationship of biogenic amines to endothelial damage is appropriate. The study should allow the prediction of oxygen toxicity responses that cannot be experimentally measured in man. Objective - the objectives of this program are to 1) define animal models that are similar to man and which produce proliferative endothelium at low levels of hyperoxia as well as exudative lesions at high doses and acute exposure, 2) examine the dynamics of the pulmonary circulation in respect to endothelial function, capillary permeability, and the fate of biogenic amines by determining their transport in the lung and their fate if not removed at a normal rate, 3) examine lung function and the role of chemoreceptor function and possible rebound phenomena in hyperoxia and hyperbaria, 4) correlate function with morphology. How research contributes - this work supports subarea 1.5, 'Habitable Crew Environments in Air Force Operations.'

The research will study basic phenomena and their interactions in several species and under various conditions to determine the effects of hyperoxia acutely, with intermittent exposure, and after prolonged exposure. In all cases the functional changes that occur will be correlated with morphologic changes through the use of morphometric techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0023, CONTINUED OPERATION OF A BIOMEDICAL APPLICATIONS TEAM
M.P. Sieband, University of Wisconsin, Madison Campus, School of Engineering, Dept. of Biomedical Engineering, *Madison, Wisconsin* 53706 (NAS 5-26454)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, DATA FLOW COMPUTING APPROACH IN HIGH-SPEED DIGITAL SIMULATION
M.D. Ercegovac, University of California, Los Angeles Campus, School of Engineering & Applied Science, Dept. of Computer Science, *405 Hilgard Ave., Los Angeles, California* 90024 (NAG 3-132)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

7.0002, AXIALLY SYMMETRIC MOTIONS OF A ROTATING STRATIFIED FLUID
B.J. Martin, Atlanta University, School of Arts & Sciences, Dept. of Mathematical Sciences, *223 Chestnut St. S.W., Atlanta, Georgia* 30314 (NAG 8-9)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

7.0003, AUTOMATE THE MANAGEMENT OF SOFTWARE PRODUCTION SYSTEMS
R.H. Campbell, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Computer Science, *106 Engineering Hall, Urbana, Illinois* 61801 (NAG 1-138)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

7.0004, DESIGN AND APPLICATION OF PARALLEL PROCESSORS
D.L. Slotnick, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Computer Science, *106 Engineering Hall, Urbana, Illinois* 61801 (NAS 5-26405)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

7.0005, TOOLS SUPPORTING PRE-IMPLEMENTATION DEVELOPMENT OF FLIGHT CONTROL SOFTWARE
J.C. Wileden, University of Massachusetts, Amherst Campus, School of Arts & Sciences, Dept. of Computer & Information Science, *Amherst, Massachusetts* 01002 (NAG 1-115)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

7.0006, LOCAL AREA NETWORKING SUPPORT AT THE LEWIS RESEARCH CENTER
D.J. Solarek, University of Toledo, School of Engineering, Dept. of Computer Science & Engineering, *2801 W. Bancroft St., Toledo, Ohio* 43606 (NAG 3-123)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

7.0007, MULTIVARIATE DATA ANALYSIS - SIMULTANEOUS COMPARISON TEST
P.R. Krishnaiah, University of Pittsburgh, School of Arts & Sciences, Dept. of Mathematics & Statistics, *4200 5th Ave., Pittsburgh, Pennsylvania* 15260 (DF140650; AFOSR-77-3239)

Part of AFFDL's responsibility is the development of advanced flight control systems and crew stations. The use of electro-optical, multi-function controls and displays in advanced crewstations places many new demands upon the pilot's visual and information processing channels. In addition, in order to compare candidate flight control systems and crew station components, simulations and flight tests are conducted in which pilot performance is measured. However, there is no single measure of pilot performance, thus requiring the collection of many kinds of performance data and their analysis by means of multivariate statistical techniques. The objective of this work effort is twofold: (1) to examine visual information processing techniques employing fast Fourier transforms, and (2) to evaluate available multivariate statistical techniques for simultaneous comparison of mean vectors and the development of computer programs to implement these techniques. Objective 1 will result in optimized symbol formats for electro-optical displays in advanced crew stations. Objective 2 will provide a means of determining which of the candidate crew stations/flight control systems is best for the pilot.

Objective 1: Automatic pattern recognition techniques will be employed to evaluate symbol confusability both within and between symbol sets. Objective 2: Seven currently available multivariate statistical techniques will be evaluated by the contractor as to their robustness to violations of the assumptions of homogeneity of the population covariance matrix and the normality of the multivariate distribution. The most robust technique will be implemented by means of computer programs which will be available for use by AFFDL personnel.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, NASA-ASU INTERNSHIP PROGRAM
E.Y. Wang, Arizona State University, School of Liberal Arts, Dept. of Physics, *Tempe, Arizona* 85281 (NAG 3-139)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

8.0002, STUDY OF THE INTERACTION OF THE JOVIAN MAGNETOSPHERE WITH THE RINGS AND THE GALILEAN SATELLITES
C.P. Sonett, University of Arizona, School of Liberal Arts, Dept. of Planetary Sciences, *Tucson, Arizona* 85721 (NAGW 124)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

8.0003, EXPERIMENTAL ATOMIC PHYSICS
R.V. Pyle, University of California, Berkeley Campus, Lawrence Berkeley Lab., *Berkeley, California* 94720 (W-7405-ENG-48)

The purpose of the program described in this proposal is to obtain and disseminate atomic collision information which is needed for the design and interpretation of confinement experiments and reactor concepts, with emphasis on neutral beam generation and interactions. The main topics that we propose to investigate are extensions of present work: (1) production of H/sup -/, D/sup -/, and He/sup -/ ions in gases, vapors, and on low-work function surfaces, with emphasis on lower particle energies; (2) conversion of D/sup -/ ions to fast D/sup O/atoms in gases and plasmas; (3) neutralization, ionization, and dissociation of energetic heavy ions and molecules (contained in neutral beams), as required for diagnostic purposes; (4) relative photon emission cross sections, needed for neutral beam diagnostics; and (5) interactions of helium ions with vapors (e.g., lithium), needed for alpha-particle diagnostics in D-T burning plasmas.

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

8.0004, COHERENT RADIATION FROM RELATIVISTIC BEAM-PLASMA INSTABILITIES (15118-P)
G. Benford, University of California, Irvine Campus, School of Physical Sciences, Dept. of Physics, *Irvine, California* 92664 (DA0F9122; DAAG29-78-G-0020)

To obtain high-power mm and sub-mm radiation based on the electromagnetic emission from plasmas in which instabilities are excited by a relativistic electron beam. Relevance: This program is relevant to the mm and sub-mm program that is underway at HDL as well as programs at other DOD laboratories. HDL is also interested in this research as a source of x-ray radiation for their radiation-damage studies.

Experimental and theoretical efforts will be carried out to determine the precise beam-plasma resonance, to understand the spectrum of the emitted radiation, to determine how the peak of the radiation can be moved to sub-mm wavelengths, and to determine the influence of boundaries on emission spectrum and efficiency.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0005, MAGNETIC TURBULENCE IN PLASMAS WITH MAGNETIC NULL POINTS
R.L. Stenzel, University of California, Los Angeles Campus, School of Letters & Science, Dept. of Physics, *405 Hilgard Ave., Los Angeles, California* 90024 (PHY79-23187)

A program for experimental investigations of magnetic field fluctuations in plasmas will be performed in a large high beta laboratory plasma subject to dynamic tearing and reconnection processes which are of great current interest to basic, fusion, and space plasma physics. With the help of a digital data acquisition system, higher order correlations between three-component vectors will be analyzed. It will be possible to distinguish fluctuations in direction from those in magnitude of the field vectors. The magnetic turbulence properties are determined by measuring probability densities, mean values, auto and cross-power spectra densities and correlations with other plasma parameters such as currents, densities, and temperatures. Finally, the effect of the turbulence on particle confinement and transport properties will be investigated using test particle diagnostic techniques previously developed for experiments on electrostatic turbulence.

This is the first year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

8.0006, RADIATION AND LASER POTENTIAL OF HOMO- AND HETERO-NUCLEAR RARE GAS DIATOMIC MOLECULES
W.C. Walker, University of California, Santa Barbara Campus, School of Letters & Science, Dept. of Physics, *Santa Barbara, California* 93106 (DF046700; AFOSR-77-3137)

AF function - upper atmosphere effects on Air Force operations and advanced short wavelength lasers. Deficiency - there is insufficient knowledge available of the spectroscopic properties of rare gas continua which occurs in the vacuum ultraviolet region of the spectrum. Objective - study spectroscopically the electronic, vibrational and rotational structures of homo-and hetero-nuclear rare gas dimers and excimers. Determine accurate, molecular constants and potential energy curves for the ground and excited states. How work contributes - low lying electronic states of homo- and hetero-nuclear rare gas diatomic molecules are of intrinsic importance in understanding long range forces. In addition, these molecules are also of interest because they are a source of intense vacuum ultraviolet (VUV) radiation and are candidates for VUV laser systems.

For the purpose of studying the homo- and hetero-nuclear rare gas diatomics and rare gas halide and oxide excimers, high-resolution spectroscopic methods will be employed. Studies will include emission and absorption spectroscopy in the visible near and vacuum ultraviolet regions. Pressure dependence of excimer emission will be determined and radiative lifetimes of important excimer emission bands using pulsed UV synchrotron radiation are planned for measurement.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0007, ATMOSPHERIC EMISSION MEASURMENTS FROM CALIFORNIA TO THE SOUTH POLE

D.G. Murcray, University of Denver, School of Arts & Sciences, Dept. of Physics, *2115 S. University Blvd., Denver, Colorado* 80210 (DPP79-24307)

An atmospheric emission spectrometer will be operated on NSF's research-configured LC-130 aircraft. Data on the concentration and latitudinal variability of a variety of important atmospheric trace gases will be obtained over Antarctica and on the deployment flight from California to the South Pole. The data obtained on these flights will be analyzed on return to the home laboratory.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Polar Programs

8.0008, RESEARCH ON SOLAR-PUMPED LIQUID LASERS

R.T. Schneider, State University System of Florida, University of Florida, School of Engineering, Dept. of Nuclear Engineering Sciences, *220 Black Hall, Gainesville, Florida* 32611 (NAG 1-135)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

8.0009, HIGH TEMPERATURE NONLINEAR CONSTITUTIVE MATERIAL BEHAVIOR WITH THERMAL FATIGUE

S. Nemat Nasser, Northwestern University, Evanston Campus, Technological Inst., Dept. of Civil Engineering, *633 Clark St., Evanston, Illinois* 60201 (NAG 3-134)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

8.0010, ACCELERATOR OPERATIONS

R. Huson, U.S. Dept. of Energy, Fermi National Accelerator Lab., *P.O. Box 500, Batavia, Illinois* 60510 (006334 TICNO; CH-3000-201)

This subtask covers the operation of all components of the 200/500eV accelerators. The objective of the program is to provide beams of protons that fit the requirements of the high-energy physics research program. The operating systems include the two 750-kV preaccelerators, the 200-MeV LINAC, the 8-GeV fast-cycling booster synchrotron, the 200/500 GeV Main Accelerator, and the primary beam extraction and switchyard systems. A total of eight targets, seven external proton beam targets and one internal beam target, are available.

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research, Office of High Energy & Nuclear Physics

8.0011, PROPERTIES OF CRYSTALLINE CONDENSED GLASS

R.O. Simmons, University of Illinois, Urbana Champaign Campus, Materials Research Lab., *Urbana, Illinois* 61801 (004408 TICNO; CH-1198-025)

Direct structural information about atomic motions and phase transformations in the solid state and about atomic defects can be obtained by neutron and by x-ray-scattering techniques. This research program uses such techniques to study either model systems (such as crystalline condensed gases), or systems of possible technological importance (such a A-15 superconductors), or both (solid methane and hydrogen). The model systems include solid noble gases, with current focus upon helium and its isotopic mixtures. For hcp 4He, a study of the momentum density distribution is proceeding, using energetic neutrons from the Argonne spallation source. For bcc 4He and bcc 3He thermal vacancy measurements are aimed to elucidate the character of the defects whose motion has associated quantum wavelengths comparable to interatomic spacings. For 3He-4He mixtures, direct x-ray study of phase separation processes is possible for the first time. Also in these mixtures, thermal defect production and interactions present a challenge to existing many-body theoretical treatments of such quantum crystals. Mixtures of different 3He concentration are found to exhibit some qualitatively different defect characteristics. Finally, our high-resolution x-ray techniques, developed for study of such systems as solid methane (which shows solid-solid phase transitions associated with changes in molecular orientational order), have proven applicable to resolve some existing questions in A-15 superconductors (V3Si, V3Ge) showing complex transitions or unusual thermal expansions.

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

8.0012, ENERGY TRANSFER IN ATOMIC AND MOLECULAR SYSTEMS

D.H. Winicur, University of Notre Dame, Radiation Lab., *Notre Dame, Indiana* 46556 (004361 TICNO; CH-0038-009)

Molecular beam methods are being used to examine the mechanisms, cross sections, and intermediate species involved in energy transfer in elementary processes. Interactions between metastable, excited rare-gas atom and various small molecules such as CO2, H2O, (CH2)2O, H2, and F2 are determined from measurements of differential-scattering cross sections using crossed-molecular beams. The results from these experiments provide detailed information on the nature of the interactions during the molecular collision, indicate the states present immediately after the initial energy transfer, and allow a determination of the potential-energy curves for the interacting species. Current emphasis is on potential energy surfaces of electronically excited rare-gas atom/molecular complexes, processes involving translational-to-rotational and translational-to-vibrational energy exchange, reactions of electronically excited neon and argon with water, and the mechanism of formation or rare gas/halogen exciplexes. Understanding of energy transfer mechanisms is of particular importance to the development of chemical lasers and it is planned to extend these studies to a wide variety of energy transformations of interest to radiation, photo-, laser, and atmospheric chemistry.

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

8.0013, INVESTIGATION IN LIQUID HELIUM OF BULK TURBULENCE GENERATED BY ULTRASOUND IN THE MEGAHERTZ RANGE

C.W. Smith, University of Maine, Orono Campus, School of Arts & Sciences, Dept. of Physics, *36 Winslow Hall, Orono, Maine* 04473 (DF045790; AFOSR-76-3113)

AF function - this proposed research primarily falls in the 5.3 research objectives which deal with electrical power for manned and unmanned aircraft, satellites and space stations. Research is required in the generation of usable electric power from non-nuclear energy sources, distribution and conditioning of the power and the attendant material requirements. The superconducting generators and pulse superconductivity energy storage systems have the requirement that the temperature of the systems be below the critical temperature. Thus one needs to understand the best transport and other physical properties of liquid helium. Deficiency - as an example of the reason one needs more efficient ways of keeping the system cool, over 90 percent of the weight of a superconductive energy storage system results from the cryogenic coolant and its storage container. Objective - this research describes a study of nonlinear wave phenomena and their relation to the turbulent state in liquid helium. Special emphasis will be given to homogeneous initiation of bulk turbulence, its growth and decay dynamics and its interaction with ions, first sound, second sound, laser light and heat transfer. Contribution - this research is a part of a comprehensive program in super fluids and superconductors.

The proposed study of nonlinear wave phenomena and turbulence in liquid helium is divided into four groups of experiments based upon the primary measuring techniques. Group A, first-sound techniques are used as an effective source of turbulence and as a diagnostic tool to characterize the state and analyse its physical character; group B, optical techniques based upon the variation of the index of refraction with density can be used to measure sound modes, wave profile and nonlinear effects in liquids; group C, second-sound techniques - two aspects (temperature-entropy waves) are currently under investigation. They are the interaction of second sound with turbulence and the generation of second sound by high intensity first sound. Explicitly, the investigation of attenuation of second sound by the acoustically generated bulk turbulence will be made; and group D, transport processes including heat transfer will be examined by investigating temperature difference between copper and liquid helium when the copper is externally heated. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0014, PROPERTIES OF LARGE NEARLY PERFECT CRYSTALS AT VERY LOW TEMPERATURES

J. Weber, University of Maryland, College Park Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *College Park, Maryland* 20742 (NAG 1-151)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

8.0015, EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF INTERACTION OF INTENSE RADIATION WITH ATOMS

S. Ezekiel, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (PHY79-09739)

This research program is concerned with experimental and theoretical investigations of atom-field interaction and related phenomena. This includes the development of an ultra stable CW dye laser which is essential for probing the incredibly narrow features recently uncovered in multi-level interactions, the experimental study of the behavior of 3-level and 4-level system in weak and intense fields, theoretical studies of bistability which may lead to some experimental investigations, and some theoretical calculations of the behavior of multi-level systems in the presence of Doppler and collisional broadening. Finally, some high-precision spectroscopy on a dense cold beam of hydrogen is proposed.

This research is a continuation of that previously supported under NSF grant PHY77-07156A01.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

8.0016, INTERACTION OF MONATOMIC AND DIATOMIC MOLECULES WITH SOLID SURFACES

H.Y. Wachman, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF042650; F44620-76-C-0036)

AF function - aerospace vehicles. Deficiency - Air Force flight operations are affected by atmospheric conditions of cloud formation, ice formation on vehicle surfaces or as clouds or precipitation, by fog, and by particle impact damage. Lack of knowledge of aerosol dynamics and of nucleation and growth of ice crystals increases the difficulty of devising ways to achieve all-weather capability in weapons delivery. For vehicles at orbital altitude, lack of fundamental dynamical information about the behavior of gas-crystal boundaries and adsorbed layers hinders the design of sensor and windows and the assessment of their contamination by ambient gases. Objective - to obtain fundamental data in the laboratory which are necessary to complete models of the dynamics and growth of snow and ice in high altitude clouds and assess the effect of the operation of aerospace vehicles on atmospheric properties, to study in detail the dynamics of aerosols which are of interest to applications to flight environment and to pollutant diffusion, and to substantially improve the laboratory capability to measure the properties of target surfaces as they influence the dynamics of impinging gas molecules. How work contributes - this work will contribute to the understanding of the dynamics of ice particle and water droplet formation and dispersion and the dynamics of adsorbed layers of molecules.

Time of flight (TOF) spectrometer measurements will be made of molecular beams impinging on target surfaces and of molecules from the beam as they are scattered by the surface in various directions. These TOF measurements, when combined with surface force measurements, can be used to determine residence times of particles on the surface and also the energy and momentum exchange at the surface. Theoretical studies will treat the problem of homogeneous nucleation and the dynamics of adsorbed layers.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0017, SUPERRADIANCE - NEW METHODS OF PRODUCTION AND DETAILED STUDIES OF NEW EFFECTS

M.S. Feld, Massachusetts Inst. of Technology, School of Science, Dept. of Physics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (PHY78-18120)

This research in atomic physics will study certain aspects of superradiance which is a fundamental effect involving the coherent spontaneous emission of light by a collection of atoms or molecules. The program will include the study of superradiance by two new methods: (1) creation of a fully inverted (pi) initial state by adiabatic inversion of an optically-thick sample and (2) preparation of an optically-thick system in a pi/2 configuration by suddenly terminating a resonant saturating field. The research will also study basic features of superradiant emission and explore theoretical predictions using these new techniques of producing superradiant radiation, as well as now standard optical pumping methods.

This is the first year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

8.0018, EXPERIMENTAL AND THEORETICAL STUDIES OF THE EARTH'S UPPER ATMOSPHERE

J.W. Meriwether, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Physics, *Ann Arbor, Michigan* 48104 (ATM80-05359)

This grant funds a combined experimental and theoretical program of research on the Earth's upper atmosphere.

A significant field program will be pursued to study the dynamic behavior of the thermosphere in the 'transition zone' between high latitudes and mid-latitudes. This will be accomplished by moving a Fabry-Perot instrument to Calgary, Canada. This will provide altitude-averaged winds, but will provide them on a significant number of nights, to improve statisti-

cal definition of events in which energy deposited at high latitudes surges towards low latitudes. This instrument will be part of a longitude chain of similar optical instruments. This same facility will also be used to expand a data base of ion drifts in this latitude band, to explore plasma convection patterns in this latitude region.

Another effect will be to continue study of the population of the thermosphere by fast oxygen atoms generated in the deceleration of energetic oxygen ions precipitating into the high latitude ionosphhre. Recent work by this group suggest that a permanent oxygen corona may exist at high latitudes at times of maximum solar activity.

Work will also proceed on extending Fabry-Perot interferometry from single to multiple etalon interferometry. The improved instrumental resolution would extended wind measuring capability from nighttime only into the daytime as well.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

8.0019, QUANTUM DYNAMICS OF MOLECULAR INTERACTIONS

W.R. Gentry, University of Minnesota, Minneapolis Campus, School of Liberal Arts, Dept. of Physics & Astronomy, *322 Johnston Hall, Minneapolis, Minnesota* 55455 (CHE79-08346)

This research is in the area of quantum chemistry; it involves molecular beam scattering. Drs. Gentry and Giese intend to continue pulsed molecular beam measurements of differential cross-sections for state-resolved rotational transitions in atom-diatom and diatom-diatom collisions, and to extend this research to the study of vibrational-rotational energy transfer processes. Taking advantage of the unique capabilities offered by the combination of a pulsed molecular beam and a pulsed laser, they also plan to study bimolecular reactive collisions of excited molecules, and the dynamics of unimolecular fragmentation following vibrational or electronic excitation under collision-free conditions. This research represents a continuation of that currently supported by Foundation grant CHE7611368.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Chemistry

8.0020, RELAXATION KINETICS IN ORGANIC GLASSES

R.R. Alfano, City University of New York, City College, School of Liberal Arts & Sciences, Dept. of Physics, *Convent Ave. & 138th St., New York, New York* 10031 (NAG 3-130)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

8.0021, STRESS INDUCED LONG WAVELENGTH PHOTOCONDUCTIVITY IN DOPED SILICON INFRARED DETECTORS

J.R. Houck, Cornell University, Ithaca Campus, School of Arts & Sciences, Dept. of Physics, *Ithaca, New York* 14850 (NAG 2-70)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

8.0022, SEARCH FOR FAR INFRARED RADIATION FROM OPTICALLY PUMPED DEFECT MODES (16513-P)

A.J. Sievers, Cornell University, Ithaca Campus, School of Arts & Sciences, Dept. of Physics, *Ithaca, New York* 14850 (DA0G9163; DAAG29-79-C-0170)

To investigate the nonequilibrium far-infrared dynamics of molecules embedded in dielectric crystals. Relevance: The fundamental technological problem in the NMMW spectral region is the lack of sources. The systems to be studied have the potential to be the solid-state analogue of the very successful gaseous FIR optically pumped lasers. However, devices based upon this concept would be both tunable and compact.

The molecules will be optically pumped with resonant CO2 laser radiation and FIR properties studied by means of FIR Fourier transform spectroscopic techniques.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0023, NASA-CLEVELAND STATE UNIVERSITY INTERNSHIP PROGRAM

C.P. Goradia, Cleveland State University, School of Engineering, Dept. of Electrical Engineering/Physics, *1983 E. 24th, Cleveland, Ohio* 44115 (NAG 3-138)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

8.0024, THEORY OF HIGH BASE RESISTIVITY BSF SILICON SOLAR CELL

C.P. Goradia, Cleveland State University, School of Engineering, Dept. of Electrical Engineering/Physics, *1983 E. 24th, Cleveland, Ohio* 44115 (NAG 3-144)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

8.0025, THERMAL AND STRUCTURAL PROPERTIES OF MOLECULAR BEAM DEPOSITED DIAMOND

H. Jackson, University of Cincinnati, McMicken College of Arts & Sciences, Dept. of Physics, *Van Wormer Adm. Bldg., Room 204, Cincinnati, Ohio* 45221 (NAG 3-128)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

8.0026, EVALUATION OF MOIRE TECHNIQUE FOR WIND TUNNEL METROLOGY

J.S. Harris, University of Dayton, School of Arts & Sciences, Dept. of Physics, *300 College Park Ave., Dayton, Ohio* 45469 (NAG 1-143)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

8.0027, ELECTRODEPOSITION OF CHROMIUM AND COPPER IN MAGNETIC FIELDS (15104-MS)

J. Dash, Oregon State Higher Education System, Portland State University, School of Science, Dept. of Physics, *1620 S.W. Park Ave., Portland, Oregon* 97207 (DA0F9182; DAAG29-78-G-0076)

To develop improved understanding of the effects of magnetic fields on the electrodeposition of non-ferromagnetic metals, e.g., chromium. Relevance: This research is relevant to the Army's utilization of electrodeposition of chromium in gun tubes for erosion protection, in munitions, chemical storage containers and other materiel for corrosion protection, and is also relevant to the need for more efficient utilization of strategic materials.

Develop a quantitative model to explain the effect of magnetic fields on the kinetics and efficiency of cathode processes during electrodeposition of copper and chromium. Determine the structure and properties (i.e., microhardness and corrosion-resistance) of metallic deposits as a function of magnetic field strength during electrodeposition.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0028, PLASMA SYSTEMS ANALYSIS

W.A. Houlberg, U.S. Dept. of Energy, Oak Ridge National Lab., *P.O. Box X, Oak Ridge Operations Office, Oak Ridge, Tennessee* 37830 (003852 TICNO; 00044(19))

The purpose of the Plasma System Analysis (PSA) activity is to evolve plasma-related design criteria for fusion devices based on D-D and D-T plasmas. This objective is achieved through parametric investigations of the potential operating space available to these reacting plasmas. In order to carry out

these investigations, a comprehensive set of computer simulation models of the plasma will be established, upgraded, benchmarked, and used to define the technology-based engineering work required for bringing fusion power to fruition. The PSA activity will be carried out within the TOKAMAK Theory Group with additional personnel from Plasma Technology and Experimental sections. In addition, consultants with appropriate expertise will be used.

BIBLIOGRAPHIC REFERENCES: Rome, J.A., W.A. Houlberg and Y-K.M. Reng, Fusion: Neutral Beam Technology, Science 203: 316 (1979).

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research, Office of Fusion Energy

8.0029, BASIC NEUTRON PHYSICS RESEARCH
J.A. Harvey, U.S. Dept. of Energy, Oak Ridge National Lab., Physics Div., *P.O. Box X, Oak Ridge, Tennessee* 37830 (AK-01-01-01-2)

The purpose of this program is to measure, analyze, and interpret neutron cross sections principally of enriched isotopes for basic nuclear physics but also to be responsive to applied cross section needs for fission and fusion reactors. The measurements are made with the ORNL electron linear accelerator. This program covers five types of experiments: (1) High-resolution differential elastic (and inelastic) scattering measurements from approximately 30 keV to approximately 2 MeV to determine the l-values of resonances of light or near-closed-shell nuclides uniquely. (2) High-resolution total cross-section measurements from 0.01 eV to 40 MeV to study the fragmentation of single-particle states for light or near-closed-shell nuclides, the more complex multiple quasi-particle nature of medium-weight nuclides and s-, p-, and d-wave neutron strength functions and statistical properties of complex nuclides. (3) High-resolution gamma-ray spectral measurements from neutron capture in individual resonances up to approximately 50 keV to obtain a better understanding of the nature of the capturing process and for nuclear spectroscopy of nuclides up to excitation energies of several MeV, particularly those which cannot be studied in detail by other means. (4) Capture cross-section measurements up to neutron energies of approximately 1100 keV of nuclides of importance in the chronology of element formation in the galaxy, of nuclides to contribute to the better understanding of the capturing process, and for applied needs such as establishing neutron capture cross-section standards and for reactors. (5) Reaction cross-section measurements such as the (n, alpha) reaction in the resonance energy region to learn about the nature of the processes and possible intermediate structure; also, accurate (n,alpha) measurements on Li-6 to establish it as a standard for keV neutron fluxes.

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research, Office of Basic Energy Sciences

8.0030, THEORETICAL STUDY OF PULSAR MAGNETOSPHERES
F.C. Michel, Rice University, Wiess School of Natural Sciences, Dept. of Space Physics & Astronomy, *6100 Main, Houston, Texas* 77001 (AST79-14379)

The research to be carried out in this grant will be concerned with studies of the magnetospheres of pulsars. Particular emphasis will be placed on solving, in a completely consistent manner, the case where the magnetic dipole field assumed to exist in the pulsar is parallel or antiparallel to the spin axis of the neutron star. There will be studies of the manner in which particles are injected into the magnetosphere of the pulsar and how this can lead to the emission of the observed intense coherent radio emission that is characteristic of pulsars. There will also be an analysis of the magnetospheric structure of pulsars observed to be emitting X-ray radiation. The studies will attempt to determine the particle and field environments around such pulsars.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

8.0031, THEORETICAL STUDIES OF THERMOSPHERIC COMPOSITION, ENERGETICS AND DYNAMICS
D.G. Torr, Utah Higher Education System, Utah State University, School of Science, Dept. of Physics, *Main Bldg., Office 104, Logan, Utah* 84321 (ATM80-05088)

This grant provides support for a program of study of ionosphere-magnetosphere coupling, and of the energetics and dynamics of the thermosphere. The research includes theoretical work involving studies of the ionosphere-plasma environment using a computer model, developed by the principal investigator, as a comprehensive number tool for studying thermal plasma coupling processes. Ultimately, it should lead to a greatly improved understanding of the mechanisms controlling the formation and behavior of the plasmasphere and ionosphere.

A second component of the theoretical research involves interpretation of ground-based measurements obtained by high resolution spectrometric remote sensing of the thermosphere. An instrument (the WISID) is currently under development under separate NSF funding. This instrument will be capable of broadband high resolution measurements of many weak atmospheric emissions. The data will be used to study the composition, energetics, and dynamics of the thermosphere.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

8.0032, OPTICAL DETECTION OF ELECTRON SPIN RESONANCE IN COMPOUND SEMICONDUCTORS
B. Henderson, University of Dublin Trinity College, Physical Lab., *Dublin, Ireland* (DA0E9302; DAERO 79 G0028)

Develop techniques and study luminescense and recombination of free and bound electrons, holes, and excitons in III-V and II-VI semiconductor compounds and alloys.

Optical detection of magnetic resonance and spin-dependent photoconductivity of semiconducting solids will be investigated. Both techniques make use of spin-dependent effects for observation of photo-excited phenomena in semiconductors.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Research & Standardization Group

SOCIAL SCIENCES

Includes Social Sciences (general); Administration and Management; Documentation and Information Science; Economics and Cost Analysis; Law and Political Science; and Urban Technology and Transportation.

9.0001, PROVIDE SERVICES TO THE GSFC CAREER DEVELOPMENT CENTER
Z.B. Leibowitz, University of Maryland, College Park Campus, Graduate School, *College Park, Maryland* 20742 (NAS 5-26448)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, A PROGRAM OF INNOVATIVE RESEARCH IN OPTIC AND ELECTRO-OPTICS FOR SPACE ASTRONOMY
J.R. Angel, University of Arizona, School of Liberal Arts, Dept. of Astronomy, *Tucson, Arizona* 85721 (NAGW 121)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

10.0002, FAR-INFRARED OBSERVATIONS OF EXTRA-GALACTIC MOLECULAR CLOUDS
L.J. Richard, Howard University, Graduate School of Arts & Sciences, Dept. of Physics & Astronomy, *2400 6th St. N.W., Washington, District of Columbia* 20001 (NAG 2-78)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

10.0003, SUPERNOVAE AS COSMOLOGICAL DISTANCE INDICATORS
W.D. Arnett, University of Chicago, School of Physical Sciences, Dept. of Astronomy & Astrophysics, *5734 S. Ellis Ave., c/o Hinds Geophysics Lab., Chicago, Illinois* 60637 (NAGW 123)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

10.0004, A SEARCH FOR GLOBULAR CLUSTER WINDS FROM SOFT X-RAY OBSERVATIONS (ABBREV)
A.P. Cowley, University of Michigan, Ann Arbor Campus, School of Literature Science & the Arts, Dept. of Astronomy, *Ann Arbor, Michigan* 48104 (NAG 8-383)

A search for globular cluster winds from the soft x-ray observations, the doubly-pulsing x-ray source 4U1145-6 - hot components in symbiotic stars.

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0005, HIGH RESOLUTION X-RAY OBSERVATIONS OF CD GALAXIES IN RICH CLUSTERS
D. Richstone, University of Michigan, Ann Arbor Campus, School of Literature Science & the Arts, Dept. of Astronomy, *Ann Arbor, Michigan* 48104 (NAG 8-354)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0006, TWO-TO-FOUR MICRON SPECTROSCOPY - HYDROXYL IONS AND WATER OF HYDRATION IN INTERSTELLAR GRAINS
R.F. Knacke, State University of New York, Stony Brook Campus, School of Arts & Sciences, Dept. of Earth & Space Sciences, *Stony Brook, New York* 11790 (NAG 2-56)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

10.0007, PHYSICAL NATURE OF COMETS
A.H. Delsemme, University of Toledo, School of Arts & Sciences, Dept. of Physics & Astronomy, *2801 W. Bancroft St., Toledo, Ohio* 43606 (AST79-14789)

The program of establishing brightness profiles in the monochromatic light of different molecular, ionic and atomic emissions in comets will be continued. In particular, numerous brightness profiles will be established for Comet West, as a function of its heliocentric distance, from a sequence of spectrograms previously obtained in Toledo. The brightness profiles will be measured in two directions, sunwards and antisunwards. The program will be further developed from spectrograms, obtained either from ground-based observatories (in Toledo or elsewhere) for the major ions (like H, O or CO) and radicals (like CN or C) or to be obtained from space with the International Ultraviolet Explorer (mainly for H, C and O) should a bright comet appear. This approach has provided the only direct observation known so far for the plasma behavior ahead of a comet, and will yield, therefore, a better understanding of its interaction with the solar wind. It will also considerably diminish one of the major uncertainties in the measure of the vaporization rate of different gases from the cometary nucleus, and will be therefore an important step towards understanding their mysterious chemisty. Theoretical studies linking hypotheses of cometary origin to their chemical and physical nature will also be undertaken.

Prior support was by NSF grant AST 76-07116A01.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0008, SUPPORT OF RESEARCH IN X-RAY ASTRONOMY
G. Garmire, Pennsylvania State University, University Park Campus, School of Science, Dept. of Astronomy, *211 Whitmore Lab., University Park, Pennsylvania* 16802 (NAGW 108)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

10.0009, SPECTROSCOPY OF METHANE FOR THE ATMOSPHERES OF THE OUTER PLANETS
K. Fox, University of Tennessee, Knoxville Campus, School of Liberal Arts, Dept. of Physics & Astronomy, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (NAGW 125)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space Science

10.0010, DENSITY AND TEMPERATURE STRUCTURE OF CLOUDS AROUND LOW LUMINOSITY YOUNG STARS
P.M. Harvey, University of Texas, Austin Campus, School of Natural Sciences, Dept. of Astronomy, *200 W. 21st St., Austin, Texas* 78712 (NAG 2-67)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

10.0011, CONSTRUCTION AND INSTALLATION OF A REMOTELY CONTROLLED CASSEGRAIN SPECTROGRAPH SYSTEM FOR THE MCDONALD OBSERVATORY 2.7-METER TELESCOPE
H.J. Smith, University of Texas, Austin Campus, School of Natural Sciences, Dept. of Astronomy, *200 W. 21st St., Austin, Texas* 78712 (AST76-23326)

A Cassegrain spectrograph system will be constructed and installed at the 2.7-meter (107-inch) telescope of the McDonald Observatory of the University of Texas. The design of this system will be modelled on the automated Miller spectrograph at the Lick Observatory of the University of California. The system will consist of four major parts: (1) the telescope utility bench, which will support the spectrograph, detector calibration lamps and the television guiding system; (2) the Cassegrain spectrograph; (3) the detector system; and (4) the read-out and data-handling system.

Actual construction of most of the parts of the system will be carried out at the McDonald Observatory Shop, located at the Bee Caves Research Center and Observatory. Construction should take approximately one year. Installation and operation will begin in the second year.

Scientific projects that will make use of the new spectrograph will cover many areas of astrophysics: radio galaxies, galaxies in clusters, quasi-stellar objects, time-resolved spectroscopy of rapidly varying stellar sources such as cataclysmic binaries, variable white dwarf stars, dwarf cepheids, and flare stars.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

GENERAL

11.0001, TECHNOLOGY TRANSFER TO MINORITY ENTERPRISES
R.G. King, University of Southern California, Graduate School, *3551 University Ave., Los Angeles, California* 90007 (NASW 3461)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Space & Terrestrial Applications

11.0002, CONFERENCE ON REMOTE SENSING EDUCATION
S.M. Davis, Purdue University, Graduate School, *Executive Bldg., West Lafayette, Indiana* 47907 (NAS 5-26406)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

11.0003, A THREE-DIMENSIONAL 'S' DUCT BENCHMARK EXPERIMENT
O. Rackham, University of London, Imperial College of Science & Technology, *Prince Consort Rd., South Kensington, London, England, United Kingdom* (NASW 3435)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

VOLUME 19 NUMBER 14/JULY 23, 1981

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N81-23008# European Space Agency, Paris (France).
CONTRIBUTIONS TO THE 9TH SYMPOSIUM ON AIRCRAFT INTEGRATED DATA SYSTEMS
Feb. 1981 370 p refs Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" DFVLR, Brunswick Report DFVLR-Mitt-79-03, Feb. 1978 p 7-362 Proceedings held at Friedrichshafen, West Germany, 26-27 Sep. 1978 Original report in GERMAN previously announced as N80-25275
(ESA-TT-532; DFVLR-Mitt-79-03) Avail: NTIS HC A16/MF A01

Aircraft subsystems which are required for the detection, description, and recording of the aircraft operating conditions as well as the flight events are addressed. These systems supply the crew with flight information necessary for an effective execution of the flight mission. Safety and economics are among the factors considered. For individual titles, see N81-23009 through N81-23023.

N81-23009# European Space Agency, Paris (France).
EXPERIENCES WITH A FLIGHT DATA RECORDING SYSTEM (FDRS) IN A GERMAN AIRFORCE FIGHTER BOMBER WING AFTER FIELD TRIALS **c06**
H. Harsch (Jagdbombergeschwader 34 Memmingen) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 10-24 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 11-26 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

A one year test of the LEADS-200 digital flight data recording and processing system was carried out. Both hardware and software aspects of the system are described. The test data are given and discussed in detail. Accident and maintenance aspects, flight safety, and operational management are emphasized. Author (ESA)

N81-23010# European Space Agency, Paris (France).
ENGINE PARAMETER TREND ANALYSIS WITH LEADS 200: POSSIBILITIES AND LIMITATIONS **c07**
W. Koschel (Lehrstuhl und Inst. fuer Strahlantriebe und turboarbeitsmaschinen der Technischen Hochschule Aachen) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 25-52 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 27-52 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

Causes of fighter aircraft engine damage were analyzed in order to identify engine components that should be monitored over the long term so as to ensure aircraft safety. The possibility of recognizing deterioration of these components using data from the LEADS 200 flight recorder system is discussed and illustrated using performance data from the J79-MTU-K1K engine system. Author (ESA)

N81-23011# European Space Agency, Paris (France).
INVESTIGATIONS INTO LOCAL FAULT DETECTION ON TURBOJET ENGINES **c07**
H. Toenskoetter (Inst. fuer Strahlantriebe und Turboarbeitsmaschinen Rheinish-Westfaelische Technische Hochschule Aachen) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 53-79 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 57-83 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

Results of the experimental investigations carried out with simulated faults in a single spool turbojet engine are presented. The effect of small disturbances, such as low compressor air bleed, a single removed turbine guide vane, or one plugged fuel nozzle on local and circumferentially averaged aerothermodynamic parameters are described. The location of the investigated faults by an engine condition monitoring system is studied and the possibility of including an analysis of circumferential flow nonuniformities at turbine exit for fault detection in the hot section of an engine is discussed. Author (ESA)

N81-23012# European Space Agency, Paris (France).
LOCATION OF FAULTS IN JET ENGINES BY CALCULATION OF COMPONENT CHARACTERISTICS **c07**
G. Dahl (Brunswick Univ.) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 80-106 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 85-112 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

A method to calculate the component characteristics of single spool jet engines was developed using measured engine data. The method was tested by simulating many different faults on a J-65 engine, recording measured engine data, and performing a fault diagnosis on the basis of the measured data. The method is capable of locating single and multiple faults of arbitrary nature and magnitude. Author (ESA)

N81-23013# European Space Agency, Paris (France).
THE ENGINE USAGE MONITORING SYSTEM: AN HEURISTIC APPROACH TO COST EFFECTIVE DATA MONITORING AND ANALYSIS **c07**
F. Robinson (Rolls Royce, Ltd., Bristol) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems ESA-TT-532) Feb. 1981 p 107-134 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 113-138 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

An engine monitoring system is described that is capable of accurately measuring low cycle fatigue during service operations. Up to 16 parameters relating to engine reliability

can be recorded at intervals 0.5 sec. Data are recorded on cassettes for ground processing. Author (ESA)

N81-23014# European Space Agency, Paris (France).
RELATIONSHIPS FOR A FLIGHT PERFORMANCE COMPUTER **c05**
M. Kloster *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 135-146 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 139-150 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

Formulas which approximate drag, thrust, and fuel consumption as functions of altitude and Mach number are discussed. Flight performance in the case of steepest climb and greatest acceleration is derived. It is shown that the resulting equations can be numerically solved by a small onboard computer. The formulas are simplified in order to obtain analytic relations. Author (ESA)

N81-23015# European Space Agency, Paris (France).
CLASSIFICATION OF OPERATING CONDITIONS OF TURBOMACHINES FROM SOLID BORNE SOUND **c07**
D. Barschdorf (Karlsruhe Univ.), B. Stuehlen (Karlsruhe Univ.), and W. Mach (Karlsruhe Univ.) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 147-164 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 151-168 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

A method for continuously monitoring turbine engine conditions using acoustic signature procedures is presented. Rotor synchronous measurement of accelerometer values and formal pattern recognition methods are used. Correlation between measured data and certain working or fault machine conditions is accomplished by data collection during a learning phase. Only small computers are needed to implement the method. Author (ESA)

N81-23016# European Space Agency, Paris (France).
REDUCTION OF MEASURED DATA AND POSSIBILITIES FOR EARLY DETECTION OF SENSOR BREAK-DOWN **c06**
G. Dahl (Technische Univ., Brunswick) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 165-181 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 169-185 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

Procedures were developed that prepare and reduce automatically recorded data in order to assess the reliability of sensors. The data were divided into blocks of constant levels and statistical methods were used to determine their mean value, standard deviation, and regression line. A strong increase in the variation coefficient is found to indicate sensor faults. Author (ESA)

N81-23017# European Space Agency, Paris (France).
DESCRIPTION OF THE BRITISH CIVIL AVIATION AIRWORTHINESS DATA RECORDING PROGRAMME (CAADRP) **c06**
H. D. Ruben (Civil Aviation Authority, Redhill, England) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 182-209 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 187-214 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

The application of routine operational flight recorder data to airworthiness problems and the maintenance of safety standards are described. The various ways in which the data are analyzed, are illustrated with examples. A brief history of airworthiness data recording is presented as well. Author (ESA)

N81-23018# European Space Agency, Paris (France).
THE SYDAS FLIGHT DATA PROCESSING SYSTEM **c06**
C. Dupuy (Enertec Schlumberger, Paris) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 210-229 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 215-235 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

The use of the SYDAS system for the maintenance and safety of aircraft is shown. Data from a variety of aircraft types are processed automatically and completely. The system checks syncword and aircraft data system calibration, verifies time sequencing, displays documentary data, converts parameters into engineering units, identifies flight modes, checks limit exceedances, and records condensed data as well as flight anomalies separately. Data may be presented as lists, or graphs and plots of flight paths while statistical calculations are possible. Unique features of the system include both bit and frame synchronizers. The functions of the system during the data acquisition and reduction phase are also described. Author (ESA)

N81-23019# European Space Agency, Paris (France).
THE USE OF AIRCRAFT INTEGRATED DATA SYSTEM AT KLM **c06**
R. A. Hartman (KLM Royal Dutch Airlines, Schiphol Airport) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 230-262 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 237-268 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

An aircraft integrated data system that is able to interrogate up to 350 parameters of some 40 aircraft systems is described. Sampled flight data are recorded and subsequently analyzed by special ground based computer programs. The use of the output of these programs by engineering and operational departments to investigate incidents, aircraft, and flight crew performance, and flight safety is described. Author (ESA)

N81-23020# European Space Agency, Paris (France).
NAVAIDS CALIBRATION EVALUATION WITH A COMPUTER-CONTROLLED AVIONICS DATA ACQUISITION SYSTEM **c04**
F. J. Abbink (Nationaal Lucht-en Ruimtevaartlaboratorium, Amsterdam) and R. Krijn (Nationaal Lucht-en Ruimtevaartlaboratorium, Amsterdam) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 263-324 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 269-311 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

A computer system is described that allows the acquisition of aircraft data and their use to evaluate the applicability and accuracy of multidistance measuring equipment positioning. The system was also used as a reference for the calibration of both Doppler and standard VOR stations in the Netherlands and for the calibration of an inertial sensor system. The system is also used for the measurement of air traffic control radar signals. The power density of the pulses of the primary and secondary radar are presented as time histories, antenna patterns, and vertical coverage diagrams. Author (ESA)

N81-23021# European Space Agency, Paris (France).
THE RECONSTRUCTION OF FLIGHT PATHS FROM AIDS DATA WITH THE AID OF MODERN FILTERING METHODS **c04**
W. Benecke and K. Hurrass *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 325-337 refs Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 313-326 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

A method is described that allows the reconstruction of the flight path of an aircraft in cases when a modern, airborne, autonomous navigation system is unavailable. The method uses the true airspeed, the VOR bearing, and the DME distance and applies optimum smoothing techniques. The smoothing operation consists of two steps: (1) forward filtering (the Kalman filter equations are solved for the point in time considered, estimated

values and the corresponding co-variance matrices are obtained as results), and (2) backward smoothing (the equations and the backward filter are solved backward in terms of time, the estimated values of the forward filter being used and improved). Data from a test flight are used to illustrate the method. Author (ESA)

N81-23022# European Space Agency, Paris (France).
DETECTION AND LOCATION OF FAULTS IN ONBOARD AIRCRAFT SYSTEMS WITH THE AID OF THE AUTOMATIC FAULT IDENTIFICATION SYSTEM (AFIS) c06
H. Kalbe (MBB, Hamburg) and F. Hildebrandt (MBB, Hamburg) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-352) Feb. 1981 p 338-354 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdat-ensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 327-344 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

A device to monitor aircraft systems performance is described. Operation modes include the continuous monitoring of aircraft systems, automatic fault identification, trend data sampling, and single signal interrogations. The microcomputer based system is operated onboard and results in improved maintenance activity, reduces the crew workload, and leads to increased dispatch reliability. Author (ESA)

N81-23023# European Space Agency, Paris (France).
PROCESSING OF AIDS FLIGHT RECORDER DATA FOR A QUICK LOOK WITH THE AID OF A HYBRID COMPUTER SYSTEM c60
H. Hoffman *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 355-370 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 345-362 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

The translation of flight data recorder information into data which are stored in 12 bit words on computer compatible magnetic tape is described. The translation makes use of a hybrid computer and passes through the following steps: active filtering, use of a one bit analog to digital converter, and change from serial to parallel data. Author (ESA)

N81-23024# Aeronautical Research Labs., Melbourne (Australia).
STRUCTURAL DESIGN OF BFRP PATCHES FOR MIRAGE WING REPAIR
R. Jones and R. J. Callinan Jul. 1980 21 p refs
(AD-A097195; ARL/Struc-Note-461) Avail: NTIS HC A02/MF A01 CSCL 01/3

This paper is concerned with the design aspects of two repair schemes developed for application to the lower wing skin of Mirage aircraft. Both repairs involve bonding a boron fiber reinforced plastic (BFRP) patch to the wing skin. In one instance the skin is cracked and the patch is acting as a crack stopper, while in the other instance the patch covers a series of holes and its prime purpose is to lower the stress field. Author (GRA)

N81-23025# Missouri Univ. -Columbia. Dept. of Industrial Engineering.
AN ANALYSIS OF OPPORTUNISTIC MAINTENANCE POLICY FOR THE F100PW100 AIRCRAFT ENGINE Final Report, 1 Jan. - 31 Dec. 1980
Michael C. Smith 31 Dec. 1980 51 p refs
(Grant AF-AFOSR-0102-80; AF Proj. 2304)
(AD-A097548; AFOSR-81-0313TR) Avail: NTIS HC A04/MF A01 CSCL 01/3

An analytic model for computing optimal screening intervals for replacing life-limited parts in the F100PW100 aircraft engine is presented. The model involves determining the point in advance of a part life limit where the marginal cost of replacing a part equals the marginal expected cost of not replacing the part. The policy results in a set of Conditional Part Level (CPL) screens conditioned o~ the status of the module and engine at the time of engine removal. The policy is evaluated through comparison with a base/depot screening approach. The evaluation is accomplished through a simulation of the 20-year life cycle of the F100 engine. The evaluation demonstrates the economic and performance advantages of the CPL screening policy. Model assumptions include independent part failures and exponential failure distributions for parts without life limits. Further investigation of the impact of the assumptions is suggested.
Author (GRA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N81-23026*# McDonnell Aircraft Co., St. Louis, Mo. Dept. of Aerodynamics.
INVESTIGATION OF THE INTERACTION OF LIFT JETS AND A GROUND PLANE Final Report
Donald R. Kotansky and L. W. Glaze Apr. 1980 107 p refs
(NASA-CR-152343) HC A06/MF A01 CSCL 01A

Wall jet flow fields resulting from the impingement of turbulent jets emanating from rectangular nozzles with exit area aspect ratios of one, two, and three were investigated. The azimuthal distributions of wall jet radial momentum flux about the jet impingement point were determined under subsonic, choked, and under-expanded exit flow conditions. The flux distributions were found to be highly sensitive to nozzle exit aspect ratio, jet impingement angle, nozzle pressure ratio, and nozzle exit height above ground. The flux distributions obtained were incorporated into an existing ground flow field prediction computer program, and predicted stagnation line locations were compared with actual stagnation lines for several two- and three-jet rectangular nozzle jet impingement configurations. The effect of free jet merging on fountain force was investigated. Flux distribution points of high aspect ratio nozzles were further defined. J.D.H.

N81-23027*# Nielsen Engineering and Research, Inc., Mountain View, Calif.
CALCULATION OF TWO-DIMENSIONAL INLET FLOW FIELDS BY AN IMPLICIT METHOD INCLUDING VISCOUS EFFECTS: USER'S MANUAL Final Topical Report, 12 Sep. 1979 - 30 Nov. 1980
Sedat Biringen and Oden J. McMillan Washington NASA May 1981 26 p refs
(Contract NAS1-15951)
(NASA-CR-3412; NEAR-TR-231) Avail: NTIS HC A03/MF A01 CSCL 01A

Inlet flow fields for airbreathing missiles are calculated by the adaptation of a two dimensional computational method developed for the flow around airfoils. A supersonic free stream is assumed to allow the forebody calculation to be uncoupled from the inlet calculation. The inlet calculation employs an implicit, time marching finite difference procedure to solve the thin layer Navier-Stokes equations formulated in body fitted coordinates. The mathematical formulation of the problem and the solution algorithm are given. Numerical stability and accuracy as well as the initial and boundary conditions used are discussed. Instructions for program use and operation along with the overall program logic are also given. Author

N81-23028*# Lockheed-Georgia Co., Marietta.
TRAILING EDGE WAKE FLOW CHARACTERISTICS OF UPPER SURFACE BLOWN CONFIGURATIONS Final Report, Aug. 1977 - Dec. 1978
N. N. Reddy Dec. 1978 435 p refs
(Contract NAS2-9615)
(NASA-CR-152224; LG78ER0252) Avail: NTIS HC A19/MF A01 CSCL 01A

Mean and fluctuating flow characteristics in the wake of upper surface blown flap configurations are presented. Relative importance of the longitudinal and the transverse components of the wake flow turbulence for noise generation are evaluated using correlation between the near-field noise and the wake turbulence. Effects of the jet velocity, the initial turbulence in the jet, and the flap deflection angle on noise and wake flow characteristics are studied. The far-field noise data is compared with the existing empirical prediction method. The measured wake flow properties are compared with an analytical model used in

the existing USB wake flow noise theory. The detailed wake flow profiles, wake flow turbulence space-time correlations, wake flow turbulence cross-power spectra, and near-field noise third octave band spectra are presented in the appendices. Author

N81-23029*# Nielsen Engineering and Research, Inc., Mountain View, Calif.
A STUDY OF REAL JET EFFECTS ON THE SURFACE PRESSURE DISTRIBUTION INDUCED BY A JET IN A CROSSFLOW Final Report, 1 May 1980 - 1 Mar. 1981
Stanley C. Perkins, Jr. and Michael R. Mendenhall Mar. 1981 158 p refs
(Contract NAS2-10623)
(NASA-CR-166150; NEAR-TR-237) Avail: NTIS HC A08/MF A01 CSCL 01A

A study of jet exit profile, exit Mach number, swirl and turbulence level on jet-induced loadings for jets exhausting from a surface into a crossflow is presented. The importance of each of these real jet characteristics is assessed using available data. Where adequate surface pressure distribution data are available, a correlation method to predict surface pressure for a jet exhausting from an infinite flat plate is used either to attempt to develop a correlation based on the real jet characteristics or to model the effects of that characteristic. Data comparisons are presented for selected cases. Also, a summary of information on surface pressure distribution data for jet exhausting from flat plates into a subsonic crossflow is presented. Author

N81-23030*# General Dynamics Corp., Fort Worth, Tex.
ANALYSIS OF WIND TUNNEL TEST RESULTS FOR A 9.39-PER CENT SCALE MODEL OF A VSTOL FIGHTER/ ATTACK AIRCRAFT. VOLUME 1: STUDY OVERVIEW Final Report, 10 Sep. 1979 - 10 Feb. 1981
J. R. Lummus, G. T. Joyce, and C. D. OMalley Oct. 1980 97 p 4 Vol.
(Contract NAS2-10344)
(NASA-CR-152391-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 01A

The ability of current methodologies to accurately predict the aerodynamic characteristics identified as uncertainties was evaluated for two aircraft configurations. The two wind tunnel models studied horizontal altitude takeoff and landing V/STOL fighter aircraft derivatives. R.C.T.

N81-23031*# General Dynamics Corp., Fort Worth, Tex.
ANALYSIS OF WIND TUNNEL TEST RESULTS FOR A 9.39-PER CENT SCALE MODEL OF A VSTOL FIGHTER/ ATTACK AIRCRAFT. VOLUME 2: EVALUATION OF PREDICTION METHODOLOGIES Final Report, 10 Sep. 1979 - 10 Feb. 1981
J. R. Lummus, G. T. Joyce, and C. D. OMalley Oct. 1980 139 p 4 Vol.
(Contract NAS2-10344)
(NASA-CR-152391-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 01A

An evaluation of current prediction methodologies to estimate the aerodynamic uncertainties identified for the E205 configuration is presented. This evaluation was accomplished by comparing predicted and wind tunnel test data in three major categories: untrimmed longitudinal aerodynamics; trimmed longitudinal aerodynamics; and lateral-directional aerodynamic characteristics. R.C.T.

N81-23032*# General Dynamics Corp., Fort Worth, Tex.
ANALYSIS OF WIND TUNNEL TEST RESULTS FOR A 9.39-PER CENT SCALE MODEL OF A VSTOL FIGHTER/ ATTACK AIRCRAFT. VOLUME 3: EFFECTS OF CONFIGURATION VARIATIONS FROM BASELINE Final Report, 10 Sep. 1970 - 11 Nov. 1980
J. R. Lummus, G. T. Joyce, and C. D. OMalley Oct. 1980 373 p 4 Vol.
(Contract NAS2-10344)
(NASA-CR-152391-Vol-3) Avail: NTIS HC A16/MF A01 CSCL 01A

The aerodynamic characteristics of the components of the baseline E205 configuration is presented. Geometric variations from the baseline E205 configuration are also given including a matrix of conrad longitudinal locations and strake shapes. R.C.T.

N81-23033*# General Dynamics Corp., Fort Worth, Tex.
ANALYSIS OF WIND TUNNEL TEST RESULTS FOR A 9.39-PER CENT SCALE MODEL OF A VSTOL FIGHTER/ ATTACK AIRCRAFT. VOLUME 4: RALS R104 AERODYNAMIC CHARACTERISTICS AND COMPARISONS WITH E205 CONFIGURATION AERODYNAMIC CHARACTERISTICS Final Report, 10 Sep. 1979 - 10 Feb. 1981
J. R. Lummus, G. T. Joyce, and C. D. OMalley Oct. 1980 136 p 4 Vol.
(Contract NAS2-10344)
(NASA-CR-152391-Vol-4) Avail: NTIS HC A07/MF A01 CSCL 01A

The longitudinal and lateral-directional aerodynamic characteristics of the RALS R104 wind tunnel model are summarized. Configurations for the E205 are also presented for comparison. R.C.T.

N81-23034*# Old Dominion Univ., Norfolk, Va.
INVESTIGATION OF AERODYNAMIC CHARACTERISTICS OF WINGS HAVING VORTEX FLOW USING DIFFERENT NUMERICAL CODES Progress Report, 1 Sep. 1978 - 31 Aug. 1979
C. Subba Reddy and G. L. Goglia Apr. 1981 59 p refs
(Grant NsG-1561)
(NASA-CR-165706) Avail: NTIS HC A04/MF A01 CSCL 01A

The aerodynamic characteristics of highly sweptback wings having separation-induced vortex flow were investigated by employing different numerical codes with a view to determining some of the capabilities and limitations of these codes. Flat wings of various configurations-strake wing models, cropped, diamond, arrow and double delta wings, were studied. Cambered and cranked planforms have also been tested. The theoretical results predicted by the codes were compared with the experimental data, wherever possible, and found to agree favorably for most of the configurations investigated. However, large cambered wings could not be successfully modeled by the codes. It appears that the final solution in the free vortex sheet method is affected by the selection of the initial solution. Accumulated span loadings estimated for delta and diamond wings were found to be unusual in comparison with attached flow results in that the slopes of these load curves near the leading edge do not tend to infinity as they do in the case of attached flow. Author

N81-23035*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
AN ASYMPTOTIC UNSTEADY LIFTING-LINE THEORY WITH ENERGETICS AND OPTIMUM MOTION OF THRUST-PRODUCING LIFTING SURFACES Thesis
Ali Reza Ahmadi Apr. 1981 345 p refs
(Grant NGR-22-009-818)
(NASA-CR-165679) Avail: NTIS HC A15/MF A01 CSCL 01A

A low frequency unsteady lifting-line theory is developed for a harmonically oscillating wing of large aspect ratio. The wing is assumed to be chordwise rigid but completely flexible in the span direction. The theory is developed by use of the method of matched asymptotic expansions which reduces the problem from a singular integral equation to quadrature. The wing displacements are prescribed and the pressure field, airloads, and unsteady induced downwash are obtained in closed form. The influence of reduced frequency, aspect ratio, planform shape, and mode of oscillation on wing aerodynamics is demonstrated through numerical examples. Compared with lifting-surface theory, computation time is reduced significantly. Using the present theory, the energetic quantities associated with the propulsive performance of a finite wing oscillating in combined pitch and heave are obtained in closed form. Numerical examples are presented for an elliptic wing. M.G.

N81-23036*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TWO-DIMENSIONAL AERODYNAMIC CHARACTERISTICS OF THE NACA 0012 AIRFOIL IN THE LANGLEY 8 FOOT TRANSONIC PRESSURE TUNNEL
Charles D. Harris Apr. 1981 139 p refs
(NASA-TM-81927) Avail: NTIS HC A07/MF A01 CSCL 01A

Data are presented for lift coefficients from near zero through maximum values at Mach numbers from 0.30 to 0.86 and Reynolds numbers of 3.0 x 10 to the sixth power with transition fixed. A limited amount of data is presented near zero and maximum lift for a Reynolds number of 6.0 x 10 to the sixth power with transition fixed. In addition, transition free data is presented through the Mach number range from 0.30 to 0.86 for near zero lift and a Reynolds number of 3.0 x 10 to the sixth power. T.M.

N81-23037*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TOPOLOGY OF THREE-DIMENSIONAL SEPARATED FLOWS

Murray Tobak and David J. Peake Apr. 1981 46 p refs

(NASA-TM-81294; A-8554) Avail: NTIS HC A03/MF A01 CSCL 01A

Based on the hypothesis that patterns of skin-friction lines and external streamlines reflect the properties of continuous vector fields, topology rules define a small number of singular points (nodes, saddle points, and foci) that characterize the patterns on the surface and on particular projections of the flow (e.g., the crossflow plane). The restricted number of singular points and the rules that they obey are considered as an organizing principle whose finite number of elements can be combined in various ways to connect together the properties common to all steady three dimensional viscous flows. Introduction of a distinction between local and global properties of the flow resolves an ambiguity in the proper definition of a three dimensional separated flow. Adoption of the notions of topological structure, structural stability, and bifurcation provides a framework to describe how three dimensional separated flows originate and succeed each other as the relevant parameters of the problem are varied. Author

N81-23038*# Cornell Univ., Ithaca, N. Y. School of Mechanical and Aerospace Engineering.

PREDICTION OF THE TURBULENT WAKE WITH SECOND-ORDER CLOSURE

D. B. Taulbee (State Univ. of New York, Buffalo) and J. L. Lumley May 1981 42 p refs

(Grants NsG-2382; NSF ATM-79-22006; NSF CME-79-19817) (NASA-CR-164294; FDA-81-03) Avail: NTIS HC A03/MF A01 CSCL 01A

A turbulence was envisioned whose energy containing scales would be Gaussian in the absence of inhomogeneity, gravity, etc. An equation was constructed for a function equivalent to the probability density, the second moment of which corresponded to the accepted modeled form of the Reynolds stress equation. The third moment equations obtained from this were simplified by the assumption of weak inhomogeneity. Calculations are presented with this model as well as interpretations of the results. E.D.K.

N81-23039*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FULL-SCALE AERODYNAMIC CHARACTERISTICS OF A PROPELLAR INSTALLED ON A SMALL TWIN-ENGINE AIRCRAFT WING PANEL

Philip R. Barlow, Victor R. Corsiglia, and Joseph Katz May 1981 22 p refs

(NASA-TM-81285; A-8478) Avail: NTIS HC A02/MF A01 CSCL 01A

Full-scale measurements of shaft thrust and torque were made. Wind-tunnel speeds and blade angles were set for full-scale flight conditions. Excellent quality measurements were obtained of the thrust coefficient, the power coefficient, and the propeller efficiency for various values of the advance ratio and the blade incidence angle at 3/4-blade radius. A conventional propeller theory found in the literature was applied to the present results. Although thrust, power, and efficiency were somewhat overpredicted, the advance ratio for maximum efficiency was predicted quite accurately. It was found that, for some conditions, spinner drag could be significant. A simple correction that was based on the spinner base pressure substantially accounted for the changes in efficiency that resulted from this cause. T.M.

N81-23040*# Kansas Univ. Center for Research, Inc., Lawrence. Center for Research, Inc.

AN INVESTIGATION OF DRAG REDUCTION FOR A STANDARD TRUCK WITH VARIOUS MODIFICATIONS Final Report

Vincent U. Muirhead May 1981 56 p refs

(Grant NsG-4023)

(NASA-CR-163107; KU-FRL-406-2) Avail: NTIS HC A04/MF A01 CSCL 01A

A wind tunnel investigation was conducted to determine the influence of several physical variables on the aerodynamic drag of a standard truck model. The physical variables included: a cab mounted air deflector; a boattail on the rear of the cargo compartment; flow-vanes on the front of the cargo compartment; and a forebody fairing over the cab. Tests were conducted at yaw angles (relative wind angle) of 0, 5, 10, 20, and 30 degrees and Reynolds numbers of 3.4 x 100,000 to 6.1 x 100,000 based upon the equivalent diameter of the vehicles. The forebody fairing and the flow-vane with the closed bottom were very effective in improving the flow over the forward part of the cargo compartment. The forebody fairing provided a calculated fuel saving of 5.6 liters per hour (1.5 gallons per hour) over the baseline configuration for a ground speed of 88.6 km/hr (55 mph) in national average winds. Author

N81-23041# New York Univ., N. Y. Mathematics and Computing Lab.

UNSTEADY TRANSONIC FLOW PAST AIRFOILS IN RIGID BODY MOTION Interim Report

I-Chung Chang Mar. 1981 211 p refs

(Contracts N00014-77-C-0032; DE-AC02-76ER-03077; NR Proj. 061-243)

(AD-A097142; DOE/ER-03077/170) Avail: NTIS HC A10/MF A01 CSCL 20/4

With the aim of developing a fast and accurate computer code for predicting the aerodynamic forces needed for a flutter analysis we review some basic concepts in computational transonics. The unsteady transonic flow past airfoils in rigid body motion is adequately described by the potential flow equation as long as the boundary layer remains attached. The two dimensional unsteady transonic potential flow equation in quasilinear form with first order radiation boundary conditions is solved by an alternating direction implicit scheme in an airfoil attached sheared parabolic coordinate system. Numerical experiments show that the scheme is very stable and is able to resolve the highly nonlinear transonic effects for flutter analysis within the context of an inviscid theory. Author (GRA)

N81-23042# Massachusetts Inst. of Tech., Cambridge.

PRELIMINARY RESULTS OF A STUDY OF UNSTEADY AIRFOIL SURFACE PRESSURES AND TURBULENT BOUNDARY LAYERS Final Report, 1 Sep. 1979 - 30 Sep. 1980

Peter F. Lorber and Eugene E. Covert Dec. 1980 38 p refs

(Contract F49620-79-C-0226; AF Proj. 2307)

(AD-A097560; MIT-TR-210; AFOSR-81-0331TR) Avail: NTIS HC A03/MF A01 CSCL 20/4

It is shown that aerodynamic interference can produce unsteady flow over a fixed airfoil up to reduced frequencies of 6.4. The resulting pressure distributions are well behaved, repeatable and, within limits, predictable. Further, it is shown that the resulting boundary layer velocity profile can be measured with the same precision as in the steady flow. Author (GRA)

N81-23043# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

METHOD FOR PREDICTING THE JET-INDUCED AERODYNAMICS OF V/STOL CONFIGURATIONS IN TRANSITION Interim Report

Marvin M. Walters and Robert E. Palmer 30 Jan. 1981 41 p refs

(WF41400000)

(AD-A097356; NADC-80205-60) Avail: NTIS HC A03/MF A01 CSCL 20/4

A method for predicting the propulsive induced aerodynamics of a VSTOL aircraft in the transition flight regime is presented. This method is applicable to low-wing, circular jet subsonic VSTOL configurations with normally exhausting jets. Validation results

for various VSTOL configurations are also presented.
Author (GRA)

N81-23044# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
BOUNDARY LAYER EFFECTS ON UNSTEADY AIRLOADS
Feb. 1981 175 p refs In ENGLISH and FRENCH Proceedings of the 15th Meeting, Aix-en-Provence, France, 14-19 Sep. 1980
(AGARD-CP-296; ISBN-92-835-0281-7) Avail: NTIS HC A08/MF A01

Recent progress in the theoretical and experimental analysis of unsteady flow is reported. Topics include boundary layer separation and boundary layer control, wing oscillations and vibratory loads, the scale effect on airfoils at transonic and subsonic speeds, and means of coupling inviscid and viscous flow. Several flow models were developed as possible tools for the introduction of viscous effects in classical aeroelastic applications. For individual titles, see N81-23045 through N81-23057.

N81-23045# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
INTRODUCTORY REMARKS ON BOUNDARY LAYER EFFECTS ON UNSTEADY AIRLOADS
Helmut Zimmermann *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 4 p (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

Unsteady aerodynamic coefficients are discussed as a function of reduced frequency in subcritical flow. The strong interaction between steady and unsteady pressure in the transonic range is discussed. This unsteady pressure distribution, apart from its Mach dependence, depends on the profile of the wing, its mean incidence, and its mean flap angle. T.M.

N81-23046*# Princeton Univ., N. J.
AN ASSESSMENT OF THEORETICAL MODELS FOR VISCOUS AND TRANSONIC FLOW
Earl H. Dowell, Marc H. Williams, and M. Ray Chi (G.E. Co., Evendale, Ohio) *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 28 p refs Sponsored jointly by NASA Ames, NASA Langley, NASA Lewis, and the Pratt and Whitney Group (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01 CSCL 01A

Topics discussed include shear flow models, simplified models for treating separation, classical linear theory, a local linearization theory, a transonic linear theory, a transonic nonlinear theory, the experiment of Davis, and the experiment of Tijdeman. It is concluded that shear flow models, which have proven very accurate in taking into account boundary layer effects for panel flutter, are likely to be less so for lifting surface flutter. For many applications in transonic flow, transonic linear theory will be adequate. T.M.

N81-23047# Boeing Military Airplane Development, Seattle, Wash.
OSCILLATING SUPERCRITICAL AIRFOILS IN THE TRANSONIC REGIME WITH VISCOUS INTERACTIONS
D. P. Rizzetta and H. Yoshihara *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 7 p refs (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

A method is presented for computing the unsteady transonic flowfield about thick supercritical airfoils in the small disturbance limit. In order to compensate for the limitations of the small disturbance assumption and also to account for the aft decambering effect of viscous displacement, the airfoil geometry is modified such that the steady mean experimental pressure distribution is recovered. In addition, effects of the unsteady shock-boundary layer interaction were simulated by placing a moving wedge-nosed ramp at the base of the shock to produce quasi-statically the reduced shock pressure rise which is observed experimentally in the steady case. T.M.

N81-23048# Centre d'Etudes et de Recherches, Toulouse (France). Dept. d'Aerothermodynamique.
METHODS FOR CALCULATING UNSTEADY TURBULENT BOUNDARY LAYERS [METHODES DE CALCUL DES COUCHES LIMITES INSTATIONNAIRES]
J. Cousteix, R. Houdeville, and J. Javelle *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 16 p refs In FRENCH; ENGLISH summary (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

Several unsteady turbulent boundary layer prediction methods were studied by using various levels of closure. The most complex methods are constituted by a set of transport equations for the components of the turbulent kinetic energy, its dissipation rate, and the turbulent shear stress. The simplest methods consist in solving the global boundary layer equations. For certain applications, a linearized version of this latter method was developed. The application of these techniques and their limitations are discussed through comparisons with experimental data. T.M.

N81-23049# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
VISCOUS EFFECTS ON UNSTEADY AIRLOADS OF OSCILLATING CONFIGURATIONS
W. Geissler *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 11 p refs (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

The steady and unsteady Kutta- Joukowsky condition, boundary layer displacement effects, gap flows on wings with oscillating controls and vortex formations on rotor blade tips, on wings with highly swept leading edges and on bodies at incidence severely influence the unsteady pressure distributions and overall forces. Numerical calculations of unsteady airloads based on a sophisticated potential theory were compared with carefully measured experimental data to obtain detailed information of the viscous effects involved. T.M.

N81-23050# National Aerospace Lab., Amsterdam (Netherlands).
SOME REMARKS ON BOUNDARY LAYER EFFECTS ON UNSTEADY AIRLOADS
R. Houwink *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 7 p refs (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

Steady, quasi-steady and unsteady boundary layer effects on oscillating airfoils are discussed. The discussion is illustrated by experimental and theoretical data for wing sections with oscillating flap. Results of current investigations at NLR to obtain insight in boundary layer effects are presented, and prediction methods for unsteady airloads are included. T.M.

N81-23051# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
INTRODUCTION OF UNSTEADY BOUNDARY LAYER EFFECTS IN TWO DIMENSIONAL TRANSONIC CALCULATION
M. Couston, J. J. Angelini, J. C. LeBalleur, and P. Girodroux-Lavigne *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 16 p refs In FRENCH; ENGLISH summary (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

A computation of viscous unsteady flows over wing profiles was researched using two methods elaborated at ONERA, on one hand for the inviscid flow, within a transonic small disturbance approach, on the other hand for the calculation and coupling of viscous layer, within a strong interaction analysis. The difference between the viscous and inviscid solutions, calculated by an integral method, determines the inviscid normal velocity at the wall. The two problems, solved by implicit methods, are linked through a strong coupling, guarantee of validity for the viscous model and of regularity for separated flows solutions. The coupling was applied numerically only to nonseparated flows configurations, namely for profiles with trailing edge flap. T.M.

N81-23052# Royal Aircraft Establishment, Farnborough (England). Structures Dept.
EXPERIMENTAL FLUTTER AT HIGH SUBSONIC SPEEDS AND ITS THEORETICAL PREDICTION, TAKING INTO ACCOUNT WING THICKNESS AND REYNOLDS NUMBER
H. C. Garner and B. W. Payne (British Aerospace Aircraft Group,

Weybridge, England) *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 21 p refs (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

Half model flutter tests of a symmetrical high aspect ratio wing at stream Mach numbers M sub infinity between 0.75 and 0.90 are described. Equivalent air speeds at flutter, calculated with aerodynamics from subsonic lifting surface theory, are in fairly good agreement with the measured values up to M sub infinity = 0.86 In the range 0.86 < M sub infinity 0.89 the measured flutter speed increases rapidly until the flow is stable, contrary to the predictions with the linear theoretical aerodynamics. However, the use of approximate theories compatible with steady and quasi-steady aerodynamics flow transonic small perturbation (TSP) theory leads to the correct qualitative behavior of flutter speed. With inviscid TSP aerodynamics the rapid rise in flutter speed is anticipated by about 0.02 in M sub infinity, but allowance for the boundary layers is shown to halve this discrepancy. T.M.

N81-23053*# Scientific Research Associates, Inc., Glastonbury, Conn.
ANALYSIS OF TURBULENT FLOW ABOUT AN ISOLATED AIRFOIL USING A TIME DEPENDENT NAVIER-STOKES PROCEDURE
S. J. Shamroth and H. J. Gibeling *In* AGARD Boundary Layer Effects on Unsteady Airfoils Feb. 1981 14 p refs Sponsored in cooperation with Army Research and Technology Lab. (For primary document see N81-23044 14-02)
(Contract NAS1-15214)
Avail: NTIS HC A08/MF A01 CSCL 01A

The procedure solves the Navier-Stokes equations by the consistently split linearized block implicit method of Briley and McDonald in a body fitted coordinate system. The procedure is described and results are presented for flow about an airfoil whose incidence changes from 6 degrees to 19 degrees at a Reynolds number of one million and Mach number of 0.2. In addition, the unsteady flow about an airfoil held at a constant 19 degree incidence is examined and compared to data. T.M.

N81-23054*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL STUDIES OF SCALE EFFECTS ON OSCILLATING AIRFOILS AT TRANSONIC SPEEDS
Sanford S. Davis *In* AGARD Boundary Layer Effects on Unsteady Airfoils Feb. 1981 13 p refs (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01 CSCL 01A

Scale effects are discussed with reference to a conventional airfoil (NACA 64A010) and a supercritical airfoil (NLR 7301) at mean flow conditions that support both weak and strong shock waves. During the experiment the Reynolds number was varied from 3 x 10 to the sixth power at time history data are presented over the range of reduced frequencies that are important in aeroelastic applications. The experimental data show that viscous effects are important in the case of the supercritical airfoil at all flow conditions and in the case of the conventional airfoil under strong shock wave conditions. Some frequency dependent viscous effects were also observed. T.M.

N81-23055# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
SOME REMARKS ON THE UNSTEADY AIRLOADS ON OSCILLATING CONTROL SURFACES IN SUBSONIC FLOW
H. Foersching *In* AGARD Boundary Layer Effects on Unsteady Airloads Feb. 1981 8 p refs (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

Parameters which are neglected within the framework of linearized potential flow theory, but which are highly influential in the development of unsteady airloads on oscillating control surfaces in subsonic flow are discussed. Based on theoretical and experimental results the effects of gap width and slot geometry, finite thickness, flow viscosity, and incidence of both wing and control surface are explained. Some topics for further research work with regard to active control applications are indicated. Author

N81-23056# Royal Aircraft Establishment, Bedford (England). Structures Dept.
OSCILLATORY FLOWS FROM SHOCK INDUCED SEPARATIONS ON BICONVEX AEROFOILS OF VARYING THICKNESS IN VENTILATED WIND TUNNELS
D. G. Mabey *In* AGARD Boundary Layer Effects on Unsteady Airfoils Feb. 1981 14 p refs (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

The flow instability boundaries on a series of biconvex airfoils with thickness/chord ratios varying from 10 to 20%, set at zero incidence, were measured in a small transonic tunnel. The region of flow instability with laminar boundary layer/shock wave interactions was a little wider than the corresponding region with turbulent boundary layer/shock wave interactions. A criterion for the occurrence of the instability was developed from the measurements. Some interesting examples of dynamic wall interference effects were observed in the slotted working sections with hard slats, which were greatly reduced in the alternative slotted working sections with slats made from sound absorbing laminates. Interesting examples of dynamic interference were also observed in special comparative tests in closed working sections formed by hard or laminate walls. T.M.

N81-23057# Politecnico di Milano (Italy). Ist. di Ingegneria Aerospaziale.
EXPERIMENTS ON A TURBULENT UNSTEADY BOUNDARY LAYER WITH SEPARATION
Sergio DePonte and Arturo Baron *In* AGARD Boundary Layer Effects on Unsteady Airfoils Feb. 1981 6 p refs Sponsored in part by the Italian Research Council (For primary document see N81-23044 14-02)
Avail: NTIS HC A08/MF A01

Turbulent separation is an unsteady phenomenon in itself, even in steady external conditions. In this experiment a cyclic variation is produced in the outstream of a typical boundary layer wind tunnel with variable pressure gradient. Due to this cyclic variation, the point of separation is quasi-steady conditions is shifted in the stream wise direction approximately one third of the boundary layer length. A hot wire analysis of the velocity profiles, made by a sampling technique, shows no significant change in profile behavior, except a lag in separation and reattachment. This result seems to be important in explaining some features of dynamic stall. T.M.

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N81-23058*# Douglas Aircraft Co., Inc., Long Beach, Calif.
STUDY TO DEVELOP IMPROVED FIRE RESISTANT AIRCRAFT PASSENGER SEAT MATERIALS Final Report, 4 Dec. 1979 - 30 Sep. 1980
Fred E. Duskin, Kenneth J. Schutter, Howard H. Sieth, and Edward L. Trabold Aug. 1980 128 p refs
(Contract NAS2-9337)
(NASA-CR-152408; MDC-J4665) Avail: NTIS HC A07/MF A01 CSCL 01C

The Phase 3 study of the NASA 'Improved Fire Resistant Aircraft Seat Materials' involved fire tests of improved materials in multilayered combinations representative of cushion configurations. Tests were conducted to determine their thermal, smoke, and fire resistance characteristics. Additionally, a 'Design Guideline' for Fire Resistant Passenger Seats was written outlining general seat design considerations. Finally, a three-abreast 'Tourist Class' passenger seat assemmbly fabricated from the most advanced fire-resistant materials was delivered. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N81-23059*# Boeing Commercial Airplane Co., Seattle, Wash.
MLS: AIRPLANE SYSTEM MODELING
A. D. Thompson, B. P. Stapleton, D. B. Walen, P. F. Rieder, and D. G. Moss Apr. 1981 133 p refs
(Contract NAS1-14880)
(NASA-CR-165700; D6-48724) Avail: NTIS HC A07/MF A01 CSCL 17G

Analysis, modeling, and simulations were conducted as part of a multiyear investigation of the more important airplane-system-related items of the microwave landing system (MLS). Particular emphasis was placed upon the airplane RF system, including the antenna radiation distribution, the cabling options from the antenna to the receiver, and the overall impact of the airborne system gains and losses upon the direct-path signal structure. In addition, effort was expended toward determining the impact of the MLS upon the airplane flight management system and developing the initial stages of a fast-time MLS automatic control system simulation model. Results ot these studies are presented. A.R.H.

N81-23060# Federal Aviation Administration, Atlantic City, N.J.
A MICROCOMPUTER-BASED SIGNAL DATA CONVERTER FOR RUNWAY VISUAL RANGE MEASUREMENTS Final Report, Oct. 1979 - Apr. 1980
David M. Wainland, Glenn J. Horton, and Howard J. Meeks Feb. 1981 43 p refs
(FAA Proj. 219-151-200)
(AD-A097568; FAA-CT-80-43) Avail: NTIS HC A03/MF A01 CSCL 09/2

A laboratory model microcomputer-based Runway Visual Range (RVR) System was designed and built at the Federal Aviation Administration (FAA) Technical Center. The system includes a Microcomputer Signal Data Converter (SDC), a Remote Display, a local maintenance terminal, a cassette storage unit, a Transmissivity Display, and a Transmissometer Simulator. The Microcomputer SDC computes RVR values for up to 12 transmissometers; previous SDC designs can calculate RVR values for only 1 transmissometer. Furthermore, the microcomputer-based RVR System provides alarm checking, data storage, and RS-232 compatible data outputs that are not available in other RVR systems. Based on the improved capabilities and the microcomputer's low cost, it is concluded that Microcomputer SDC's would be cost effective at airports using more than three transmissometers. Author (GRA)

N81-23061# Federal Aviation Administration, Atlantic City, N.J.
SUMMARY OF TRANSPONDER DATA, MAY 1979 - NOVEMBER 1979
Max Greenberg Feb. 1981 29 p refs
(AD-A097569; FAA-CT-81-5) Avail: NTIS HC A03/MF A01 CSCL 17/7

The purpose of this effort was to determine the performance characteristics of air traffic control radar beacon transponders in an operational environment in general aviation aircraft. A transponder performance analyzer (TPA) was developed at the Federal Aviation Administration Technical Center to measure performance parameters of transponders installed in aircraft. The TPA was installed in a bus for mobility and simulates an air traffic control beacon interrogator (ATCBI) to facilitate measurement of 15 transponder parameters in approximately 30 seconds. A standard gain horn antenna is utilized to couple the signals between the TPA bus and the aircraft. Transponder data were collected at six different geographic locations resulting in more than 690 samples of general aviation transponders. Results show that 42 percent of the transponders met all measured parameters. This is a slight improvement over the 1977/1978 data and is attributed to inclusion of data collected at general aviation airports in the Atlanta area. It is recommended that a study be conducted to determine the effects of transponder performance on the air traffic control systems (Automated Radar Terminal System (ARTS) and National Airspace System (NAS)) by individually varying each of the 15 parameters outside of their specification limits. Author (GRA)

N81-23062# Army Aviation Development Test Activity, Fort Rucker, Ala.
FUNCTIONAL TESTING AIRBORNE NAVIGATION EQUIPMENT Final Report
3 Mar. 1981 35 p refs
(AD-A097115; TOP-6-3-205; DARCOM-R-310-6; DRSTE-RP-702-105) Avail: NTIS HC A03/MF A01 CSCL 17/7

This document provides guidance and procedures for performance testing airborne navigation equipment. The document addresses the following: Flight Planning, Range Test, Rotor Modulation, Accuracy, and Influence of Weather. It provides the test officer with general information and guidance in test preparation, test controls, test conduct, and data reduction. Author (GRA)

N81-23063# Lincoln Lab., Mass. Inst. of Tech., Lexington.
ELECTRONIC FLIGHT RULES: AN ALTERNATIVE SEPARATION ASSURANCE CONCEPT
John W. Andrews and Walter M. Hollister 31 Dec. 1980 99 p refs
(Contracts F19628-80-C-0002; DOT-FA72WAI-261)
(AD-A097570; ATC-93; FAA-RD-80-2) Avail: NTIS HC A05/MF A01 CSCL 17/7

This report presents results of a study of alternative concepts for tactically separating aircraft in low altitude en route airspace. It describes a concept designated Electronic Flight Rules (EFR) which allows aircraft to fly under instrument meteorological conditions in a manner that retains most of the freedom and flexibility of VFR flight. Feasibility considerations, potential benefits, applicable technologies, and alternative system configurations are evaluated. Author (GRA)

N81-23020# European Space Agency, Paris (France).
NAVAIDS CALIBRATION EVALUATION WITH A COMPUTER-CONTROLLED AVIONICS DATA ACQUISITION SYSTEM
F. J. Abbink (Nationaal Lucht-en Ruimtevaartlaboratorium, Amsterdam) and R. Krijn (Nationaal Lucht-en Ruimtevaartlaboratorium, Amsterdam) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 263-324 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 269-311 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23021# European Space Agency, Paris (France).
THE RECONSTRUCTION OF FLIGHT PATHS FROM AIDS DATA WITH THE AID OF MODERN FILTERING METHODS
W. Benecke and K. Hurrass *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 325-337 refs Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 313-326 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

N81-23064*# Boeing Vertol Co., Philadelphia, Pa.
PRELIMINARY DESIGN STUDY OF ADVANCED COM-

POSITE BLADE AND HUB AND NONMECHANICAL CONTROL SYSTEM FOR THE TILT-ROTOR AIRCRAFT. VOLUME 1: ENGINEERING STUDIES Final Report
H. R. Alexander, K. E. Smith, M. A. McVeigh, P. G. Dixon, and B. L. McManus Nov. 1979 263 p refs 2 Vol.
(Contract NAS2-10160)
(NASA-CR-152336-1; D210-11569-1-Vol-1) Avail: NTIS HC A12/MF A01 CSCL 01C

Composite structures technology is applied in a preliminary design study of advanced technology blades and hubs for the XV-15 tilt rotor research demonstrator aircraft. Significant improvements in XV-15 hover and cruise performance are available using blades designed for compatibility with the existing aircraft, i.e., blade installation would not require modification of the airframe, hub or upper controls. Provision of a low risk nonmechanical control system was also studied, and a development specification is given. Author

N81-23065*# Boeing Vertol Co., Philadelphia, Pa.
PRELIMINARY DESIGN STUDY OF ADVANCED COMPOSITE BLADE AND HUB AND NONMECHANICAL CONTROL SYSTEM FOR THE TILT-ROTOR AIRCRAFT. VOLUME 2: PROJECT PLANNING DATA
Feb. 1980 65 p refs 2 Vol.
(Contract NAS2-10160)
(NASA-CR-152336-2; D210-11569-2-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 01C

Project planning data for a rotor and control system procurement and testing program for modifications to the XV-15 tilt-rotor research demonstrator aircraft is presented. The design, fabrication, and installation of advanced composite blades compatible with the existing hub, an advanced composite hub, and a nonmechanical control system are required. J.D.H.

N81-23066*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
COMPARISON OF THEORETICAL PREDICTIONS OF ORBITER AIRLOADS WITH WIND TUNNEL AND FLIGHT TEST RESULTS FOR A MACH NUMBER OF 0.52
Alan L. Carter and Robert L. Sims May 1981 33 p refs
(NASA-TM-81358) Avail: NTIS HC A03/MF A01 CSCL 01C

The measurement and prediction of wing airloads for space shuttle orbiter 101 during approach and landing tests is discussed. Strain gage instrumentation, calibration, and flight data processing are covered along with wind tunnel and simulator results. The generation of theoretical predictions using the FLEXSTAB computer program is described, and the results are compared to experimental measurements. A.R.H.

N81-23067*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
A COMPARISON OF LABORATORY MEASURED TEMPERATURES WITH PREDICTIONS FOR A SPAR/SKIN TYPE AIRCRAFT STRUCTURE
Jerald M. Jenkins May 1981 23 p refs
(NASA-TM-81359) Avail: NTIS HC A02/MF A01 CSCL 01C

A typical spar/skin aircraft structure was heated nonuniformly in a laboratory and the resulting temperatures were measured. The heat transfer NASTRAN computer program was used to provide predictions. Calculated temperatures based on a thermal model with conduction, radiation, and convection features compared closely to measured spar temperatures. Results were obtained without the thermal conductivity, specific heat, or emissivity with temperature. All modes of heat transfer (conduction, radiation, and convection) show to affect the magnitude and distribution of structural temperatures. E.A.K.

N81-23068*# Grumman Aerospace Corp., Bethpage, N.Y.
AIRCRAFT WING WEIGHT BUILD-UP METHODOLOGY WITH MODIFICATION FOR MATERIALS AND CONSTRUCTION TECHNIQUES Final Report
Peter York and Raymond W. Labell Sep. 1980 120 p refs
(Contract NAS2-9805)
(NASA-CR-166173) Avail: NTIS HC A06/MF A01 CSCL 01C

An aircraft wing weight estimating method based on a component buildup technique is described. A simplified analytically derived beam model, modified by a regression analysis, is used to estimate the wing box weight, utilizing a data base of 50 actual airplane wing weights. Factors representing materials and methods of construction were derived and incorporated into the basic wing box equations. Weight penalties to the wing box for fuel, engines, landing gear, stores and fold or pivot are also included. Methods for estimating the weight of additional items (secondary structure, control surfaces) have the option of using details available at the design stage (i.e., wing box area, flap area) or default values based on actual aircraft from the data base. Author

N81-23069*# Douglas Aircraft Co., Inc., Long Beach, Calif.
COMMERCIAL AVIATION ICING RESEARCH REQUIREMENTS
L. P. Koegeboehn Apr. 1981 59 p refs
(Contract NAS3-22361)
(NASA-CR-165336) Avail: NTIS HC A04/MF A01 CSCL 01C

A short range and long range icing research program was proposed. A survey was made to various industry and goverment agencies to obtain their views of needs for commercial aviation ice protection. Through these responsed, other additional data, and Douglas Aircraft icing expertise; an assessment of the state-of-the-art of aircraft icing data and ice protection systems was made. The information was then used to formulate the icing research programs. S.F.

N81-23070*# Boeing Vertol Co., Philadelphia, Pa.
ROTORCRAFT AVIATION ICING RESEARCH REQUIREMENTS: RESEARCH REVIEW AND RECOMMENDATIONS Final Report
A. A. Peterson, L. Dadone, and A. Bevan May 1981 116 p refs
(Contract NAS3-22384)
(NASA-CR-165344; D210-11662-1) Avail: NTIS HC A06/MF A01 CSCL 01C

The status of rotorcraft icing evaluation techniques and ice protection technology was assessed. Recommendations are made for near and long term icing programs that describe the needs of industry. These recommended programs are based on a consensus of the major U.S. helicopter companies. Specific activities currently planned or underway by NASA, FAA and DOD are reviewed to determine relevance to the overall research requirements. New programs, taking advantage of current activities, are recommended to meet the long term needs for rotorcraft icing certification. A.R.H.

N81-23071*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TRANSONIC FLUTTER STUDY OF A WIND-TUNNEL MODEL OF AN ARROW-WING SUPERSONIC TRANSPORT
Charles L. Ruhlin and Charles R. Pratt-Barlow (Boeing Commercial Airplane Co., Seattle) Apr. 1981 16 p refs Presented at the AIAA Struct. Dyn. Spec. Meeting, Atlanta, 9-10 Apr. 1981
(NASA-TM-81962) Avail: NTIS HC A02/MF A01 CSCL 01C

A 1/20-size, low-speed flutter model of the SCAT-15F complete airplane was tested on cables to simulate a near free-flying condition. Only the model wing and fuselage were flexible. Flutter boundaries were measured for a nominal configuration and a configuration with wing fins removed at Mach numbers M from 0.76 to 1.2. For both configurations, the transonic dip in the wing flutter dynamic pressure q boundary was relatively small and the minimum flutter q occurred near M = 0.92. Removing the wing fins increased the flutter q about 14 percent and changed the flutter mode from symmetric to antisymmetric. Vibration and flutter analyses were made using a finite-element structural representation and subsonic kernel-function aerodynamics. For the nominal configuration, the analysis (using calculated modal data) predicted the experimental flutter q levels within 10 percent but did not predict the correct flutter mode at the higher M. For the configuration without wing fins, the analysis predicted 16 to 36 percent unconservative (higher than experimental) flutter q levels and showed extreme sensitivity to mass representation details that affected wing tip mode shapes. For high subsonic M, empennage aerodynamics had a significant

effect on the predicted flutter boundaries of several symmetric modes. A.R.H.

N81-23072*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

TRANSONIC FLUTTER AND GUST-RESPONSE TESTS AND ANALYSES OF A WIND-TUNNEL MODEL OF A TORSION FREE WING AIRPLANE

Charles L. Ruhlin and Arthur C. Murphy (General Dynamics/Fort Worth, Tex.) Apr. 1981 17 p refs Presented at the AIAA Dyn. Spec. Conf., Atlanta, 9-10 Apr. 1981

(NASA-TM-81961) Avail: NTIS HC A02/MF A01 CSCL 01C

An exploratory study of a 1/5.5 size, complete airplane version of a torsion free wing (TFW) fighter aircraft was conducted. The TFW consisted of a wing/boom/canard assembly on each fuselage side that was interconnected by a common pivot shaft so that the TFW could rotate freely in pitch. The effect of the TFW was evaluated by comparing data obtained with the TFW free and the TFW locked to the fuselage. With the model mounted on cables to simulate an airplane free flying condition, flutter boundaries were measured at Mach number (M) from 0.85 to 1.0 and gust responses at M = 0.65 and 0.90. The critical flutter mode for the TFW free configuration was found experimentally to occur at M = 0.95 and had the rigid TFW pitch mode as its apparent aerodynamic driver. R.C.T.

N81-23073# Douglas Aircraft Co., Inc., Long Beach, Calif.

FUEL/ENGINE/AIRFRAME TRADE OFF STUDY Final Report, 1 May 1978 - 1 Oct. 1980

A. T. Peacock, H. Hennig, N. C. Burmaster, E. R. Brown, R. M. Matsuo, J. R. Herrin, S. A. Mosier, J. R. Grant, J. E. Drever, and J. J. Snider Sep. 1980 260 p refs Prepared in cooperation with Union Oil Co. of Calif., Los Angeles and Pratt and Whitney Aircraft Group, East Hartford

(Contract F33615-78-C-2001; AF Proj. 3048)

(AD-A097391; AFWAL-TR-80-2038) Avail: NTIS HC A12/MF A01 CSCL 21/4

This report covers a study of the effects of broadening the specifications for JP-4 and JP-8, by increasing the freeze point, decreasing the smoke point, and extending the end point on minimizing costs and maximizing fuel availability. The study considered the impact on the engines and airframes. It was concluded that the specification maximum allowable freeze point of JP-4 or JP-8 could not be increased without degrading aircraft system performance and safety on the basis of criteria available to this study. Increases in availability were predicted for JP-4 of up to 9% and for JP-8 between 41% and 62%. A fuel price analysis was performed based on prices through 1978. Price changes subsequent to the analysis have been so rapid and so unbalanced between products that predictions cannot be made of price changes resulting from specification changes.

Author (GRA)

N81-23074# General Accounting Office, Washington, D. C. Mission Analysis and Acquisition Div.

DOD'S USE OF REMOTELY PILOTED VEHICLE TECHNOLOGY OFFERS OPPORTUNITIES FOR SAVING LIVES AND DOLLARS

3 Apr. 1981 43 p

(AD-A097419; GAO/MASAD-81-20) Avail: NTIS HC A03/MF A01 CSCL 01/3

Contents: The Status of RPV Technology: Proven, Available, and Little Used; RPVs not Popular with the Military; and Civil Use of RPVs not Likely without Military Development. GRA

N81-23075# Rockwell International Corp., Columbus, Ohio. North American Aircraft Div.

DESIGN, DEVELOPMENT, AND EVALUATION OF LIGHTWEIGHT HYDRAULIC SYSTEM, PHASE 1 Final Report, 16 Aug. 1978 - 30 Jan. 1981

Joseph N. Demarchi and Robert K. Haning Jan. 1981 273 p refs

(Contract N62269-78-C-0363)

(AD-A097505; NR81H-2; NADC-77108-30) Avail: NTIS HC A12/MF A01 CSCL 13/7

The Lightweight Hydraulic System (LHS) program assesses the advantages of using an 8000 psi operating pressure level in Navy aircraft instead of the conventional 3000 psi level. This report presents the results of Phase I of a program to design, fabricate, and test a full scale 8000 psi system in a ground simulator and A-7E flight test aircraft. Two independent lightweight hydraulic systems, powered by variable delivery 8000 psi pumps, utilize twenty 8000 psi actuators and fourteen types of LHS minor hardware items. A steel framework ground simulator was designed with LHS component installation and hydraulic distribution systems similar to the A-7E aircraft. Laboratory tests conducted on components fabricated Phase I include rod seal development, servo valve erosion, compatibility, pressure impulse, and endurance. A math model of the compatibility system was verified. Test results demonstrated that the Phase II simulator will function as designed. Weight and space analyses made on LHS components projected the 30% weight and 40% space saving goals can be achieved. Based on preliminary R M assessments of the development hardware, the MFHBF and MMH/FH improvements goal of 15% will be obtained. Author (GRA)

N81-23076# Naval Postgraduate School, Monterey, Calif. Dept. of Aeronautical Engineering.

ATTACK VS SCAN: A COMPARISON OF ENDGAME AIRCRAFT SURVIVABILITY COMPUTER PROGRAMS M.S. Thesis

James Earl Parr Dec. 1980 121 p refs

(AD-A097663) Avail: NTIS HC A06/MF A01 CSCL 09/2

This study compares two computer programs, ATTACK and SCAN, with respect to the utility and validity of each program. The comparison is made from two points of view; a model developer and a consumer. The utility considers six subject areas; (1) documentation, (2) geometric modeling, (3) P(K)/Vulnerable Area Modeling, (4) Missile, Warhead and Fuze Modeling, (5) Scenario Simulation and (6) Program Output. SCAN was determined to be superior in every area except for the missile, warhead and fuze modeling area. For the validity evaluation, equivalent models were developed for a show box target and a simple warhead for both programs. A separate plot technique was used to verify the program results. For the sample models used in the comparison, the results agreed qualitatively with those from the plot technique. Author (GRA)

N81-23077# Aeronautical Research Labs., Melbourne (Australia).

AN ANALYSIS OF THERMAL BALANCE IN THE COOLED CABIN OF A SEA KING HELICOPTER

Brian Rebbechi Mar. 1980 28 p refs

(AD-A097199; ARL/MECH-ENG-NOTE-378; AR-001-811) Avail: NTIS HC A03/MF A01 CSCL 01/3

This study arose from problems of excessive cabin temperatures encountered by the Royal Australian Navy during operation of Sea King Mk. 50 helicopters. These high temperatures were producing adverse effects on crew efficiency, particularly during flights of long duration experienced in anti-submarine missions. The Aeronautical Research Laboratories recorded cabin temperatures and humidities in one Sea King helicopter of the RAN fleet over an extended period; these measurements are reported by Rebbechi and Edwards (1979). A preliminary estimate of the cabin heat loads, together with suggestions for partially alleviating the problem, was made by Rebbechi (1977). The conclusions of this earlier work, however, were that an acceptable cabin environment could only be attained by the use of refrigeration to cool the cabin air. A vapor cycle cooling unit was subsequently built by ARL for feasibility studies of cabin cooling, and was flight tested in a Sea King helicopter. These flight trials were intended to establish the cooling capacity required in a permanently fitted installation and to evaluate the overall suitability of electrically powered vapor cycle systems. The results of these trials are reported. GRA

N81-23078# National Academy of Sciences - National Research Council, Washington, D. C. Aeronautics and Space Engineering Board.

AN EVALUATION OF NASA'S PROGRAM FOR ADVANCING ROTORCRAFT TECHNOLOGY Final Report

1978 19 p

(Contract NASw-2342)

(PB81-144180) Avail: NTIS HC A02/MF A01 CSCL 01C

A survey is made of the technological needs and opportunities for improving various types of rotorcraft over the next two

decades and the adequacy of NASA's proposed research effort to provide the necessary technology in that period. GRA

N81-23079# General Accounting Office, Washington, D. C. Logistics and Communications Div.
F-16 INTEGRATED LOGISTICS SUPPORT: STILL TIME TO CONSIDER ECONOMICAL ALTERNATIVES
20 Aug. 1980 56 p
(PB81-137473; LCD-80-89) Avail: NTIS HC A04/MF A01 CSCL 01C

While the Air Force's integrated logistics support plan for the F-16 should ensure that the aircraft will be adequately maintained, there is still time and opportunity to improve its effectiveness and reduce support costs. Several alternative operational and support concepts which Department of Defense and Air Force logistics planners need to consider for the still developing F-16 program are recommended. GRA

N81-23014# European Space Agency, Paris (France).
RELATIONSHIPS FOR A FLIGHT PERFORMANCE COMPUTER
M. Kloster *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 135-146 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 139-150 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N81-23080*# Honeywell, Inc., Minneapolis, Minn. Avionics Div.
DEMONSTRATION ADVANCED AVIONICS SYSTEM (DAAS) FUNCTIONAL DESCRIPTION Interim Report
15 Oct. 1980 197 p Prepared jointly with King Radio Corp., Olathe, Kans.
(Contract NAS2-10021)
(NASA-CR-152405) Avail: NTIS HC A09/MF A01 CSCL 01D

A comprehensive set of general aviation avionics were defined for integration into an advanced hardware mechanization for demonstration in a Cessna 402B aircraft. Block diagrams are shown and system and computer architecture as well as significant hardware elements are described. The multifunction integrated data control center and electronic horizontal situation indicator are discussed. The functions that the DAAS will perform are examined. This function definition is the basis for the DAAS hardware and software design. A.R.H.

N81-23081# Transportation Systems Center, Cambridge, Mass. Statistical Design and Analysis Branch.
GENERAL AVIATION ACTIVITY AND AVIONICS SURVEY Annual Summary Report, CY 1979
Judith C. Schwenk Jan. 1981 165 p refs Survey held in 1980; sponsored by FAA
(AD-A097604; TSC-FAA-81-1; FAA-MS-81-1) Avail: NTIS HC A08/MF A01 CSCL 01/2

This report presents the results and a description of the 1979 General Aviation Activity and Avionics Survey. The survey was conducted during 1980 by the FAA to obtain information on the activity and avionics of the United States registered general aviation aircraft fleet, the dominant component of civil aviation in the U.S. The survey was based on a statistically selected sample of about 14.2% of the general aviation fleet and obtained a response rate of 71%. Survey results are based upon responses but are expanded upward to represent the total population. Survey results revealed that during 1979 an estimated 43.3 million hours of flying time were logged by the 210,339 active general aviation aircraft in the U.S. fleet, yielding a mean annual flight time per aircraft of 203.5 hours. The active aircraft represented about 85% of the registered general aviation fleet. The report contains breakdowns of these and other statistics by manufacturer/model group, aircraft type, state and region of based aircraft, and primary use. Also included are fuel consumption, lifetime airframe hours, avionics, and engine hours estimates. Author (GRA)

N81-23082# Naval Air Systems Command, Washington, D. C.
NAVAIR AVIONICS MASTER PLAN
26 Feb. 1981 243 p
(AD-A097522) Avail: NTIS HC A11/MF A01 CSCL 09/5

The purpose of the NAVAIR Avionics Master Plan (NAMP) is to: Disseminate Naval Air Systems Command (NAVAIR) policy and guidance in all aspects of the development of Naval avionic equipment; Provide a single comprehensive document highlighting all aspects of Naval avionics - its current status, its requirements, and its long range objectives; Establish a planning baseline to serve as a foundation for overall advanced planning; Focus attention on management issues and technological problems that require resolution in the near term and on those special issues that require immediate attention to solve critical problems that require resolution in the near term and on those special issues that required immediate attention to solve critical problems to ensure the orderly availability of needed avionic equipment. Author (GRA)

N81-23083# Dynamics Research Corp., Wilmington, Mass.
DIGITAL AVIONICS INFORMATION SYSTEM (DAIS). VOLUME 1: IMPACT OF DAIS CONCEPT ON LIFE CYCLE COST Final Report
John C. Goclowski, John M. Glasier, Marjorie A. Bristol, Jonathan T. Frueh, and H. Anthony Baran (Logistics and Technical Training Div., Wright-Patterson AFB, Ohio) Brooks AFB, Tex. Air Force Human Resources Lab. Mar. 1981 72 p refs 2 Vol.
(Contract F33615-75-C-5218; AF Proj. 2051)
(AD-A097339; AFHRL-TR-81-4-(I)-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 09/3

The Digital Avionics Information System (DAIS) approach to avionics design is a total system concept rather than a functional subsystem or hardware-oriented system. DAIS uses common processing, information transfer, control and display, and support software elements to service all avionics functional areas on an integrated basis. Thus, the DAIS architecture and core elements are not dedicated to any one specific avionic function, but are used to perform the tasks of many avionic functions with the avionic sensors and subsystems. This systems approach provides flexibility to accommodate a wide variety of avionic configurations and missions, as well as redundancy to improve availability. Standardization and replication of the core elements can reduce the life cycle costs when major modifications/retrofits of an avionic configuration are considered, or when applied across the fleet by reducing unnecessary development proliferation and reducing maintenance costs. GRA

N81-23084# Dynamics Research Corp., Wilmington, Mass.
DIGITAL AVIONICS INFORMATION SYSTEM (DAIS). VOLUME 2: IMPACT OF DAIS CONCEPT ON LIFE CYCLE COST. SUPPLEMENT Final Report
John C. Goclowski, John M. Glasier, Marjorie A. Bristol, Jonathan T. Frueh, and H. Anthony Baran (Logistics and Technical Training Div., Wright-Patterson AFB, Ohio) Brooks AFB, Tex. Air Forces Human Resources Lab. Mar. 1981 136 p refs 2 Vol.
(Contract F33615-75-C-5218; AF Proj. 2051)
(AD-A097438; AFHRL-TR-81-4-(II)-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 09/3

The Digital Avionics Information System (DAIS) approach to avionics design is a total system concept rather than a functional subsystem or hardware-oriented system. DAIS uses the common processing, information transfer, control and display, and support software elements to service all avionics functional areas on an integrated basis. Thus, the DAIS architecture and core elements are not dedicated to any one specific avionic function, but are used to perform the tasks of many avionic functions with the avionic sensors and subsystems. This system approach provides flexibility to accommodate a wide variety of avionic configurations and missions, as well as redundancy to improve availability. Standardization and replication of the core elements can reduce the life cycle costs when major modifications/retrofits of an avionic configuration are considered, or when applied across the

fleet by reducing unnecessary development proliferation and reducing maintenance costs. A limited assessment of the potential effects of the DAIS concept on avionics system life cycle cost is assessed in this report by a cost comparison of a hypothetical application of a conceptual mid-1980's DAIS suite versus a conventional avionics suite used in a close-air-support (CAS) aircraft both with one major modification/retrofit. The first volume of this two volume technical report describes the cost comparison and its results. This volume supplements the first by providing additional details of the comparison, appendices, model output reports of the Life Cycle Cost Impact Modeling System (LCCIM), and data used in the comparison. Author (GRA)

N81-23009# European Space Agency, Paris (France).
EXPERIENCES WITH A FLIGHT DATA RECORDING SYSTEM (FDRS) IN A GERMAN AIRFORCE FIGHTER BOMBER WING AFTER FIELD TRIALS
H. Harsch (Jagdbombergeschwader 34 Memmingen) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 10-24 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 11-26 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23016# European Space Agency, Paris (France).
REDUCTION OF MEASURED DATA AND POSSIBILITIES FOR EARLY DETECTION OF SENSOR BREAK-DOWN
G. Dahl (Technische Univ., Brunswick) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 165-181 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 169-185 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23017# European Space Agency, Paris (France).
DESCRIPTION OF THE BRITISH CIVIL AVIATION AIRWORTHINESS DATA RECORDING PROGRAMME (CAADRP)
H. D. Ruben (Civil Aviation Authority, Redhill, England) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 182-209 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 187-214 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23018# European Space Agency, Paris (France).
THE SYDAS FLIGHT DATA PROCESSING SYSTEM
C. Dupuy (Enertec Schlumberger, Paris) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 210-229 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 215-235 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23019# European Space Agency, Paris (France).
THE USE OF AIRCRAFT INTEGRATED DATA SYSTEM AT KLM
R. A. Hartman (KLM Royal Dutch Airlines, Schiphol Airport) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 230-262 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 237-268 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23022# European Space Agency, Paris (France).
DETECTION AND LOCATION OF FAULTS IN ONBOARD AIRCRAFT SYSTEMS WITH THE AID OF THE AUTOMATIC FAULT IDENTIFICATION SYSTEM (AFIS)
H. Kalbe (MBB, Hamburg) and F. Hildebrandt (MBB, Hamburg) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-352) Feb. 1981 p 338-354 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 327-344 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N81-23085*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A NONLINEAR PROPULSION SYSTEM SIMULATION TEHNIQUE FOR PILOTED SIMULATORS
James R. Mihaloew 1981 14 p refs Presented at the 12th Ann. Pittsburgh Conf. on Modelling and Simulation, 30 Apr. - 1 May 1981; sponsored by IEEE, ISA, SCS, SMCS
(NASA-TM-82600; E-847) Avail: NTIS HC A02/MF A01 CSCL 21E

In the past, propulsion system simulations used in flight simulators have been extremely simple. This resulted in a loss of simulation realism since significant engine and aircraft interactions were neglected and important internal engine parameters were not computed. More detailed propulsion system simulators are needed to permit evaluations of modern aircraft propulsion systems in a simulated flight environment. A real time digital simulation technique has been developed which provides the capabilities needed to evaluate propulsion system performance and aircraft system interaction on manned flight simulators. A parameter correlation technique is used with real and pseudo dynamics in a stable integration convergence loop. The technique has been applied to a multivariable propulsion system for use in a piloted NASA flight simulator program. Cycle time is 2.0 ms on a Univac 1110 computer and 5.7 ms on the simulator computer, a Xerox Sigma 8. The model is stable and accurate with time steps up to 50 ms. The program evaluated the simulation technique and the propulsion system digital control. The simulation technique and model used in that program are described and results from the simulation are presented. Author

N81-23086*# United Technologies Corp., East Hartford, Conn. Commercial Products Div.
PERFORMANCE DETERIORATION BASED ON SIMULATED AERODYNAMIC LOADS TEST, JT9D JET ENGINE DIAGNOSTICS PROGRAM Final Report
W. J. Stromberg 9 Feb. 1981 301 p refs
(Contract NAS3-20632)
(NASA-CR-165297; PWA-5512-75) Avail: NTIS HC A14/MF A01 CSCL 21E

An engine was specially prepared with extensive instrumentation to monitor performance, case temperatures, and clearance changes. A special loading device was used to apply known loads on the engine by the use of cables placed around the flight inlet. These loads simulated the estimated aerodynamic pressure distributions that occur on the inlet in various segments of a typical airplane flight. Test results indicate that the engine lost 1.3 percent in take-off thrust specific fuel consumption (TSFC) during the course of the test effort. Permanent clearance changes due to the loads accounted for 1.1 percent; increase in low pressure compressor airfoil roughness and thermal distortion in the high pressure turbine accounted for 0.2 percent. Pretest predicted performance loss due to clearance changes was 0.9 percent in TSFC. Therefore, the agreement between measurement and prediction is considered to be excellent. Author

N81-23087# Defence Research Establishment Atlantic, Dartmouth (Nova Scotia). Research and Development Branch.
X-RAY FLUORESCENCE SPECTROMETRIC ANALYSIS OF WEAR METALS IN USED LUBRICATING OILS
Dwight E. Veinot Dec. 1980 20 p refs
(AD-A097552; DREA-TM-80/J) Avail: NTIS HC A02/MF A01 CSCL 07/4

An X-ray fluorescence spectrometric technique was developed for the direct determination of iron and copper wear metal concentrations in used lubricating oils from CH 124 'Sea King' helicopter engines. The X-ray fluorescence wear metal levels were compared to the atomic absorption wear metal levels determined on corresponding samples. In general, the X-ray fluorescence results indicated higher levels of wear metal contamination and also provided earlier indications of abnormal wear based on more pronounced changes in detected wear metal production than did the results obtained by atomic absorption analysis.
Author (GRA)

N81-23088# National Aeronautical Establishment, Ottawa (Ontario). Structures and Materials Lab.
THE REJUVENATION OF PROPERTIES IN TURBINE ENGINE HOT SECTION COMPONENTS BY HOT ISOSTATIC PRESSING
P. H. Floyd, W. Wallace, and J-P. A. Immarigeon Feb. 1981 26 p refs Presented at the NATO Defence Res. Board Seminar, Bremen, West Germany, 6-10 Apr. 1981
(AD-A097551; NAE-LR-605; NRC-19164) Avail: NTIS HC A03/MF A01 CSCL 21/5

A significant factor in the cost of ownership of industrial, marine and aircraft gas turbine engines is the high price of replacement of parts that have reached the limit of their original design life. Many parts, particularly those operating in the hot sections of gas turbine engines, will be replaced on a routine basis, even though they may have many thousands of safe operating hours remaining. In order to reduce costs, and to conserve materials that are rapidly becoming scarce, a great deal of effort is being expended to develop treatments that allow used parts to be refurbished and their original properties restored by regenerative heat treatments. A significant development has occurred recently in this area with the introduction of hot isostatic pressing. With hot isostatic pressing it is possible to reheat-treat service exposed parts under pressure so that precipitate structures are restored, and internal defects such as creep voids and cavities are eliminated. As a result, new metal properties can be restored in many cases. However, during hot isostatic pressing there is a tendency for grain growth to occur, for changes in grain boundary structure to occur, and for irreversible changes in carbide morphology and distribution to occur. Consequently, the effective processing of materials requires that careful control of the time, temperature and pressure conditions used in the autoclave be achieved. The particular conditions used must be established for each individual alloy of interest in order to develop the appropriate microstructural features required and thereby obtain the desired improvements in mechanical properties.
Author (GRA)

N81-23089# Naval Postgraduate School, Monterey, Calif.
INVESTIGATION OF THE USE OF LIQUID CRYSTAL THERMOGRAPHY TO STUDY FLOW OVER TURBOMACHINERY BLADES M.S. Thesis
Roy L. Brennon Sep. 1980 68 p refs
(AD-A097289) Avail: NTIS HC A04/MF A01 CSCL 14/2

The use of liquid crystal thermography was investigated as a technique for visualizing the flow over a NACA series 65 compressor blade. The demonstration of the feasibility of the technique was conducted in the low turbulence wind tunnel at the U.S. Naval Postgraduate School. Local heat transfer coefficients were obtained for Reynolds numbers varying from 100,000 to 600,000 with the angle of incidence of the blade varying from 0 degrees to 30 degrees.
Author (GRA)

N81-23090# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.
MEASUREMENT AND ANALYSIS OF THE PERIODIC VARIATION OF TOTAL PRESSURE IN AN AXIAL-FLOW COMPRESSOR STAGE Interim Report, 1 Oct. 1978 - 30 Sep. 1980
William C. Zierke and Theodore H. Okiishi Nov. 1980 114 p refs
(Contract F49620-79-C-0002; AF Proj. 2307)
(AD-A097296; AFOSR-81-0327TR; ISU-ERI-AMES-81121; TCRL-18) Avail: NTIS HC A06/MF A01 CSCL 20/4

A fast-response, total-pressure probe was used with a periodically sampling and averaging data acquisition system to study the unsteady total-pressure field in an axial-flow turbomachine. Periodically unsteady total-pressure data were used to demonstrate some of the ways in which turbomachine blade wake transport and interaction influences the energy transfer involved. Observed trends of periodic variations in local total pressures could be explained in terms of the details of energy transfer associated with the different kinds of fluid particles (freestream, wake segment, blade surface boundary layer, mixed) moving through a blade row. Some frequency response requirements of measurement systems used for turbomachine unsteady total pressure research are proposed. Examples of how the system and its components (probes, filters and amplifiers) respond to idealized wakes illustrate the necessity of a system that will faithfully respond to anticipated wake forms. The importance of the harmonic content of the unsteady data being measured is demonstrated.
Author (GRA)

N81-23091# General Electric Co., Schenectady, N. Y.
ASSESSMENT OF GAS TURBINE EROSION. VOLUME 2: EROSION ANALYSIS AND TEST PLANNING
Ralph R. Boericke, Delton A. Grey, Donald R. Spriggs, Robert G. Hantman, and Jing T. Kuo Apr. 1980 196 p refs Sponsored by New York State Energy Research and Development Authority
(PB81-139677; NYSERDA-80-3-2) Avail: NTIS HC A09/MF A01 CSCL 21E

Pressurized fluidized bed combustion was studied and tested as an economical and environmentally acceptable approach to generating electricity from coal. A key feature of this concept is combined cycle operation in which a steam turbine is powered from steam tubes immersed in the fluidized bed while the hot combustion gases are used to drive a gas turbine. A key technical area, addressed in both volumes, is the erosion and corrosion of the gas turbine blades by particles and alkali salts carried by the combustion gases. Analyses of the impact of the many components of the fluidized bed system on the turbine are provided and a test plan including the design of an erosion, corrosion simulator is set up.
GRA

N81-23092# General Electric Co., Schenectady, N. Y.
ASSESSMENT OF GAS TURBINE EROSION. VOLUME 1: ASSESSMENT OF AVAILABLE EROSION DATA
Ralph R. Boericke, Delton A. Grey, Donald R. Spriggs, Robert G. Hantman, and Jing T. Kuo Apr. 1980 150 p refs Sponsored by New York State Energy Research and Development Authority
(PB81-139685; NYSERDA-80-3-1) Avail: NTIS HC A07/MF A01 CSCL 21E

Pressurized fluidized bed combustion was studied and tested as an economical and environmentally acceptable approach to generating electricity from coal. A key feature of this concept is combined cycle operation in which a steam turbine is powered from steam tubes immersed in the fluidized bed while the hot combustion gases are used to drive a gas turbine. A key technical area is the erosion and corrosion of the gas turbine blades by particles and alkali salts carried by the combustion gases. Volume 1 summarizes the literature on the operation of gas turbines in environments similar to the pressurized fluidized bed combustion system.
GRA

N81-23010# European Space Agency, Paris (France).
ENGINE PARAMETER TREND ANALYSIS WITH LEADS 200: POSSIBILITIES AND LIMITATIONS
W. Koschel (Lehrstuhl und Inst. fuer Strahlantriebe und turboarbeitsmaschinen der Technischen Hochschule Aachen) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 25-52 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 27-52 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23011# European Space Agency, Paris (France).
INVESTIGATIONS INTO LOCAL FAULT DETECTION ON TURBOJET ENGINES
H. Toenskoetter (Inst. fuer Strahlantriebe und Turboarbeitsmaschinen Rheinish-Westfaelische Technische Hochschule Aachen) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 53-79 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte

Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 57-83 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23012# European Space Agency, Paris (France).
LOCATION OF FAULTS IN JET ENGINES BY CALCULATION OF COMPONENT CHARACTERISTICS
G. Dahl (Brunswick Univ.) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 80-106 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintegrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 85-112 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23013# European Space Agency, Paris (France).
THE ENGINE USAGE MONITORING SYSTEM: AN HEURISTIC APPROACH TO COST EFFECTIVE DATA MONITORING AND ANALYSIS
F. Robinson (Rolls Royce, Ltd., Bristol) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems ESA-TT-532) Feb. 1981 p 107-134 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 113-138 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

N81-23015# European Space Agency, Paris (France).
CLASSIFICATION OF OPERATING CONDITIONS OF TURBOMACHINES FROM SOLID BORNE SOUND
D. Barschdorf (Karlsruhe Univ.), B. Stuehlen (Karlsruhe Univ.), and W. Mach (Karlsruhe Univ.) *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 147-164 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 151-168 (For primary document see N81-23008 14-01)
Avail: NTIS HC A16/MF A01

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N81-23093*# Drexel Univ., Philadelphia, Pa. Dept. of Mechanical Engineering and Mechanics.
APPLICATION OF VARIABLE STRUCTURE SYSTEM THEORY TO AIRCRAFT FLIGHT CONTROL Interim Report
Anthony J. Calise, Isaac Kadushin, and Fred Kramer May 1981 42 p refs
(Contract NAG2-8)
(NASA-CR-164321) Avail: NTIS HC A03/MF A01 CSCL 01C

The current status of research on the application of variable structure system (VSS) theory to design aircraft flight control systems is summarized. Two aircraft types are currently being investigated: the Augmentor Wing Jet STOL Research Aircraft (AWJSRA), and AV-8A Harrier. The AWJSRA design considers automatic control of longitudinal dynamics during the landing phase. The main task for the AWJSRA is to design an automatic landing system that captures and tracks a localizer beam. The control task for the AV-8A is to track velocity commands in a hovering flight configuration. Much effort was devoted to developing computer programs that are needed to carry out VSS design in a multivariable frame work, and in becoming familiar with the dynamics and control problems associated with the aircraft types under investigation. Numerous VSS design schemes were explored, particularly for the AWJSRA. The approaches that appear best suited for these aircraft types are presented. Examples are given of the numerical results currently being generated. A.R.H.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N81-23094# North Atlantic Treaty Organization, Brussels (Belgium). Defence Research Group.
CHARACTERISTICS, PERFORMANCES AND TESTING CAPABILITIES OF FOUR MAIN EUROPEAN SUBSONIC WIND-TUNNELS (RAE-5 M, ONERA FL AND SIMA, DNW) Final Report
Ph. Poisson-Quinton, ed. Feb. 1981 82 p refs
(AC/243(CC)D/12) Avail: NTIS HC A05/MF A01

The testing capabilities of four subsonic tunnels are overviewed. Two of them, the DNW tunnel and the ONERA S1 Mondane, are of the atmospheric type; the two others, RAE 5 m and the F1 Fauga, are of the pressurized type. All these tunnels are built incorporating the concept of interchangeable test-sections, which makes possible a high degree of testing efficiency. The size of their test sections varies from 4.5 m to 9.5 m, and so it is possible to use the same large aircraft model, in each of these facilities. The two pressurized tunnels are well suited for Reynolds-Mach numbers effects analysis at subsonic speeds, and the two large atmospheric tunnels can be used for full-scale testing. Another feature is the acoustic equipment prepared in the two atmospheric tunnels for noise research around propulsive nacelle and airframe. The various types of possible tests in these installations are listed. The main characteristics and major equipments of the four tunnels are given with an inventory of the other major European Tunnels already used for subsonic, transonic, and supersonic testing. M.G.

N81-23095*# Gjerding (B. K.) Simulation Electronics, Seattle, Wash.
USER'S MANUAL FOR FLIGHT SIMULATOR DISPLAY SYSTEM (FSDS)
Connie C. Egerdahl 18 Nov. 1979 14 p
(Contract NAS2-9434)
(NASA-CR-164295) Avail: NTIS HC A02/MF A01 CSCL 14B

The capabilities of the flight simulator display system (FSDS) are described. FSDS is a color raster scan display generator designed to meet the special needs of Flight Simulation Laboratories. The FSDS can update (revise) the images it generates every 16.6 mS, with limited support from a host processor. This corresponds to the standard TV vertical rate of 60 Hertz, and allows the system to carry out display functions in a time critical environment. Rotation of a complex image in the television raster with minimal hardware is possible with the system. M.G.

N81-23096*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESCRIPTION OF RECENT CHANGES IN THE LANGLEY 6- BY 28-INCH TRANSONIC TUNNEL
William G. Sewall May 1981 45 p refs
(NASA-TM-81947; L-13609) Avail: NTIS HC A03/MF A01 CSCL 14B

Calibrations were obtained in the Langley 6 by 28-inch transonic tunnel with newly installed controllable reentry flaps and test section floor and ceiling. Using available theory, the top and bottom slotted walls were redesigned for minimum wind tunnel interference errors of blockage and stream-line curvature. To minimize Mach number gradients along the tunnel axis downstream of the model, controllable flaps were installed to regulate the flow reentering the test section through the slotted walls. The flap setting is independent of stagnation pressure and varies only with Mach number. The freestream Mach number is determined from the pressrue measured at a station 66.04 cm upstream of the model station. The model has no significant influence on the vertical Mach number distribution at this station. This method of Mach number determination appears to be more accurate than one using the plenum pressure. R.C.T.

N81-23097# Hickok (Eugene A.) and Associates, Wayzata, Minn.
NATIONAL RUNWAY FRICTION MEASUREMENT PROGRAM Final Report, Sep. 1978 - Dec. 1980
John R. MacLennan, Norman C. Wenck, Paul D. Josephson, and John B. Erdmann Dec. 1980 121 p refs
(Contract DOT-FA78WA-4242)
(AD-A097334; FAA-AAS-80-1) Avail: NTIS HC A06/MF A01 CSCL 01/5

Measurements of runway friction, pavement surface conditions and engineering data for 491 runways at 268 U.S. airports are used for statistical analysis to develop guidance materials to insure the design and maintenance of nonslippery surfaces at United States airports. Friction values are analyzed as they relate to pavement type, texture depth, grooving, and rubber accumulation. The basic concepts of Advisory Circular 150/5320-12 are supported by the data. Corrective maintenance action is recommended for runways with friction values less than the recommended value of 0.50. Author (GRA)

N81-23098# Naval Postgraduate School, Monterey, Calif.
MICROPROCESSOR GENERATED VERTICAL GYROHORIZON INSTRUMENT FOR THE BLUE BIRD SIMULATOR M.S. Thesis
Marc A. Lucchesi Dec. 1980 40 p refs
(AD-A097658) Avail: NTIS HC A03/MF A01 CSCL 05/8

An X-Y cathode ray tube display for use in a high-performance aircraft simulator facility as a Vertical Gyrohorizon Instrument was investigated. A microprocessor was used to generate the correct angle for the display corresponding to the analog equations of motion of the simulator. An unfavorable displayed result was obtained. Detailed conclusions and recommendations for further study are presented. Author (GRA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N81-23099*# National Aeronautics and Space Administration, Washington, D. C.
THE UTILIZATION OF NONTERRESTRIAL MATERIALS
Mar. 1981 196 p refs Proceedings of Workshop held at Palo Alto, Calif., Jun. 1977
(NASA-TM-83106) Avail: NTIS HC A09/MF A01 CSCL 22A

The development of research and technology programs on the user of nonterrestrial materials for space applications was considered with emphasis on the space power satellite system as a model of large space systems for which the use of nonterrestrial materials may be economically viable. Sample topics discussed include the mining of raw materials and the conversion of raw materials into useful products. These topics were considered against a background of the comparative costs of using terrestrial materialsj Exploratory activities involved in the preparation of a nonterrestrial materials utilization program, and the human factors involved were also addressed. Several recommendations from the workshop are now incorporated in NASA activities. A.R.H.

N81-23100*# System Planning Corp., Arlington, Va. Systems Research and Engineering Div.
MATERIALS PROCESSING THRESHOLD REPORT. 1: SEMICONDUCTOR CRYSTALS FOR INFRARED DETECTORS Final Report
Earl V. Sager, Terence R. Thompson, and Robert G. Nagler Feb. 1980 108 p refs
(Contract NAS8-33554)
(NASA-CR-161752; SPC-564) Avail: NTIS HC A06/MF A01 CSCL 22A

An extensive search was performed of the open literature pertaining to infrared detectors to determine what constitutes a good detector and in what way performance is limited by specific material properties. Interviews were conducted with a number of experts in the field to assess their perceptions of the state of the art and of the utility of zero-gravity processing. Based on this information base and on a review of NASA programs in crystal growth and infrared sensors, NASA program goals were reassessed and suggestions are presented as to possible joint and divergent efforts between NASA and DOD. T.M.

N81-23101# Centre National d'Etudes Spatiales, Toulouse (France).
SYMPHONIE SYMPOSIUM, 1980
1980 983 p refs Partly in ENGLISH, FRENCH and GERMAN Symp. held at Berlin, 4-7 Feb. 1980 Prepared in cooperation with DFVLR, Cologne Original contains color illustrations
Avail: NTIS HC A99/MF A01

Numerous satellite transmission experiments were conducted, and results concerning radio, television, and data transmission as well as reception are presented. Experimental configurations are described, and equipment design specifications are given. The impact of the Symphonie utilization program on various national projects is discussed. The prospects of other telecommunications programs similar to Symphonie are also considered. For individual titles, see N81-23102 through N81-23172.

N81-23102# Government of India, New Delhi.
THE ROLE OF TELECOMMUNICATION SATELLITES IN DEVELOPING COUNTRIES c15
T. V. Srirangan *In* CNES Symphonie Symp. 1980 p 25-34 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Applications for domestic and regional telecommunication and broadcasting services are identified, stressing practical assistance for socio-economic programs in the near future with meteorological and remote sensing services also playing a useful role. Possibilities for the extension of these services are discussed, taking note of the special constraints prevailing in developing countries and the trend toward global competition in satellite technology. The impact of decisions taken during the World Administrative Radio Conference of 1979 is considered. Of special consequence are: (1) the 100% expansion of the spectrum space allocated on a global basis for fixed satellite services in the 6/4 and 14/11 GHz bands; (2) the designation of uplinks for broadcasting satellite service in the 12 GHz band and the convening of related planning conferences; and (3) the holding of a special conference for the planning of space services not later than 1984. Author (ESA)

N81-23103# Centre National d'Etudes Spatiales, Toulouse (France).
THE SYMPHONIE PROGRAM: OBJECTIVES, OPERATIONS AND TECHNICAL OPERATIONS OF THE PROJECT [LE PROGRAMME SYMPHONIE: OBJECTIFS, DEROULEMENT ET ORGANISATION DU PROJET TECHNIQUE] c15
J. Muller *In its* Symphonie Symp. 1980 p 35-41 In FRENCH; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
(Proj. Symphonie)
Avail: NTIS HC A99/MF A01

The original aims of the French and German governments as revealed by the terms of the 1967 agreement and the procedure adopted for setting up the Symphonie industrial organization are shown. Decisions taken regarding system specifications are discussed. The operating principles adopted at the governmental, industrial, and project organization levels are analyzed showing how it is possible to ensure the equitable sharing of the responsibilities and industrial workloads at all times and how difficulties encountered in the course of a program can be efficiently resolved through joint action. Author (ESA)

N81-23104# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
EXPERIMENTAL UTILIZATION OF THE SYMPHONIE SYSTEM DURING THE FIRST 5 YEARS OF OPERATION [EXPERIMENTELLE NUTZUNG DES SYSTEMS SYMPHONIE WAEHREND DER ERSTEN FUENF BETRIEBSJAHRE] c15
Manfred Gass *In* CNES Symphonie Symp. 1980 p 43-50 In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
(Proj. Symphonie)
Avail: NTIS HC A99/MF A01

The impact of positioning satellites at 11.5 deg W and at 49 deg E during a 2 year period thereby achieving almost uninterrupted coverage from the American continent to China

and Indonesia is emphasized. Typical ground transmitting and receiving stations of different designs are described. Special difficulties overcome in countries with poorly developed infrastructure to support satellite communication are cited. Testing of transmission techniques, test operation of experimental domestic links and networks, demonstrations and performances on special occasions, and testing of special services as well as applications of the system in cultural and humanitarian fields are discussed. Operation of the Symphonie system beyond its nominal lifetime (5 yrs) is mentioned as possibility. Author (ESA)

N81-23105# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
THE SYMPHONIE SPACE SEGMENT **c15**
Pierre Madon *In* CNES Symphonie Symp. 1980 p 51-62 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The Symphonie spacecraft, a synchronous telecommunication satellite with three axis stabilization, using the flywheel concept, is described. The satellite has a design lifetime of 5 years. The satellite design incorporates three axis attitude control working on the principle of conservation of angular momentum and uses a static infrared Earth sensor for position determination. A passive thermal control is achieved using thermal blankets and optical solar reflectors. A high specific impulse liquid bipropellant apogee motor and a high performance bipropellant system for orbital control are included. A fixed solar generator with a daily temperature variation from - 175 C to + 70 C completes the list of system innovations. Author (ESA)

N81-23106# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Raumfahrt.
PERFORMANCE OF THE MAIN SUBSYSTEMS OF THE SYMPHONIE SATELLITES [VERHALTEN DER WICHTIGSTEN UNTERSYSTEME DER SYMPHONIE-SATELLITEN] **c15**
Kuno Schneider *In* CNES Symphonie Symp. 1980 p 63-71 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The operation of the principal subsystems and telecommunication payloads onboard the Symphonie A and B satellites is assessed. Specifically, thermal control, apogee boost motor performance, attitude and orbit control, remote command/telemetry, and power generation and conditioning are discussed. The use of redundant equipment is reviewed and the status of equipment subject to degradation is given. Unexpected events observed during operation are reported and their origin as inferred from telemetry data is discussed. Author (ESA)

N81-23107# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany).
THE SYMPHONIE GROUND STATIONS [DIE SYMPHONIE - ERDEFUNKSTELLEN] **c14**
A. Cartier and P. Okolowitz *In* CNES Symphonie Symp. 1980 p 73-78 In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The deployment of a large number and wide variety of ground stations over an area bounded by 80 deg W and 120 deg E longitude, 78 deg N and 21 deg S latitude for the Symphonie program is described. Design variety, performance, and differences in approach to implementation and utilization point not only to the diversity of the program, but also to the attitudes and specificity of the users. Fixed stations, mobile stations, ad hoc systems put together for demonstrations, in all a total of more than 50 satellite telecommunications stations were used in 20 countries. The main characteristics of these ground stations are given. Author (ESA)

N81-23108# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany).
UTILIZATION ANALYSIS OF THE EXPERIMENTAL SATELLITE SYSTEM SYMPHONIE [ANALYSES DES UTILISATIONS DU SYSTEME EXPERIMENTAL SYMPHONIE] **c32**
J.-M. Duniau and R. Menzel *In* CNES Symphonie Symp. 1980 p 79-86 In FRENCH; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Utilization of the Symphonie telecommunication capabilities, is characterized for the users. The conditions for admission are discussed with particular emphasis on limitations as regards transmission quality and coordination with other satellite networks. The operational organization of experimental satellite use is evoked and utilization types are classified. Taking statistics for a 5 year period, bar graphs demonstrate the versatility of the system as regards technical characteristics of the links established, the variety of fields concerned, and the number of countries and organizations involved. Author (ESA)

N81-23109# Deutsche Bundespost, Raisting (West Germany). Erdefunkstelle.
EXPERIMENTS SELECTED FOR THE TELECOMMUNICATIONS TEST PROGRAM OF THE GERMAN POST OFFICE [AUSGEWAEHLTE EXPERIMENTE DES FERNMELDETECHNISCHEN VERSUCHSPROGRAMMS DER DEUTSCHEN BUNDESPOST] **c32**
E. Jahries *In* CNES Symphonie Symp. 1980 p 87-102 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Measurement and experiment results obtained by the Symphonie ground station in Raisting are presented. The test program is outlined. Long term transmission properties of the satellite transponders were studied. The amplitude frequency response of ground station antennas using the Sun as noise source was determined. Optimal FM transmission parameters for telephone and television were established, and the reception of TV signals with a 4.5 m dia. microwave antenna in a metropolitan area was investigated. The special characteristics of signal interference between adjacent satellite systems were also considered. Author (ESA)

N81-23110# Direction Generale des Telecommunications, Pleumeur-Bodou (France). Centre de Telecommunications par Satellite.
VERIFICATION OF PAYLOAD SPECIFICATIONS FOR SYMPHONIE SATELLITES [VERIFICATION DES CARACTERISTIQUES EN ORBITE DE LA CHARGE UTILE DES SATELLITES SYMPHONIE] **c15**
R. Issler *In* CNES Symphonie Symp. 1980 p 103-115 ref In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The on station checking of Symphonie satellite payload performance characteristics in order to demonstrate contractor compliance with design specifications is described. The attainable accuracy of the measurement procedures which monitor system operation is briefly discussed. Tests covered effective isotropic radiated power, reception sensitivity, amplitude to frequency response, and temporal distortion of group propagation. Also established were frequency stability of the transponders, satellite gain stability, and satellite nonlinear distortion. The methods used and the results obtained are shown. The accuracies achieved are evaluated, comparing results from the French and German stations located respectively at Pleumeur-Bodou and Resisting. Author (ESA)

N81-23111# Indian Space Research Organization, Ahmedabad.
SATELLITE TELECOMMUNICATIONS EXPERIMENTS PROJECT: AN OVERVIEW **c32**
O. P. N. Calla and J. Basu (Government of India, New Delhi) *In* CNES Symphonie Symp. 1980 p 117-124 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The Satellite Telecommunications Experiments Project (STEP) was carried out using the Franco-German satellite Symphonie. The Symphonie spacecraft transponder was used for a period of 13 hours every day for a little over 2 years. The basic aims of the project are explained and analyses of the results in terms of the overall objectives that were laid down at the beginning of the project are related. The technical details of the various specific experiments, such as remote area communications experiments using an SCPC system, transportable terminals, digital communications with multiple access, network integration, TV with multiple audio channels, etc., are briefly described. The overall

network, experiment plans general experience and achievements of STEP are emphasized. Author (ESA)

N81-23112# Communication Engineering Inst., Beijing (China).
THE SYMPHONIE EXPERIMENT IN CHINA c15
Yang Qianli *In* CNES Symphonie Symp. 1980 p 125-143 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The organization, program, configuration and results of the Symphonie experiment in China are described. The transponder capabilities of Symphonie A were used for the execution of different communication experiments in television, telephone, telegraph, facsimile and data transmission. The main aims of the Symphonie experiment in China were: (1) to demonstrate the extensive possibilities of using satellite communication services in different fields; (2) to test the equipment of ground stations developed in China via an in orbit satellite; (3) to examine the transmission parameters of different transmission systems which might be used in future domestic networks in China; (4) to evaluate the feasibility of the designed in orbit testing scheme on a transponder; and (5) to promote international technical cooperation between China and European countries. These goals were met and a synopsis of utilization characteristics is given.
Author (ESA)

N81-23113# Deutsche Bundespost, Darmstadt (West Germany). Fernmeldetechnisches Zentralant.
TRANSMISSION OF TDMA SIGNALS AT 60 Mbit/s IN THE SYMPHONIE SYSTEM c32
T. Hentrich *In* CNES Symphonie Symp. 1980 p 145-161 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The digital transmission tests, results, and experience gained at the Symphonie ground station in Raisting are presented. The baseband test setup, consisting of TDMA tester and modem, and the measuring techniques as well as equipment used in digital transmission are described. Contributions introduced by the individual sections of the transmission channel via the satellite to the total bit error rate of the TDMA signal were measured for different test loops. The optimum operating point for the satellite transponder was determined for low gain amplification and the resulting distribution of uplink and downlink noise with an input back-off of 2.5 dB corresponds to an EIRP for the Raisting ground station of 83.1 dBW. Results prove the suitability of the TDMA technique (60 Mbit/sec TDMA dignals) as a transmission method for satellite communications. Author (ESA)

N81-23114# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
RESULTS OF THE 60 Mbit/s TDMA SYSTEM. TESTS VIA SYMPHONIE c15
M. D. Lombard and M. H. Herr (Deutsche Bundespost) *In* CNES Symphonie Symp. 1980 p 163-178 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Within the framework of the Symphonie project, TDMA system tests were performed between the Symphonie ground stations of Pleumeur-Bodou in France and Raisting in Germany. The TDMA terminals used for these field trials were developed according to 60 Mbit/sec TDMA Intelsat specifications. The main features of this TDMA system are briefly described and the design of the terminals is presented. The tests and the results obtained are discussed. Specific functions of the TDMA technique, such as initial acquisition fast reentry, reference station replacement, and burst position control were tested successfully under normal service conditions. The same tests were repeated under more severe conditions obtained by artificial degradation of the transmission channel or by addition of a co-channel interference circuit. These tests show that the service is still possible even under extreme conditions, i.e., bit error rate of 0.001. These tests demonstrate that this transmission system can work successfully by satellite and are of great value to the development of operational TDMA systems. Author (ESA)

N81-23115# Beijing Univ., Shijiazhuang Hebei (China). Communications Lab.
EXPERIMENTATION WITH A SPREAD SPECTRUM MULTIPLE ACCESS COMMUNICATION SYSTEM VIA THE SYMPHONIE SATELLITE c32
Jiang Kanglin and Yang Tongli *In* CNES Symphonie Symp. 1980 p 179-189 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A low bit rate spread spectrum multiple access (SSMA) system was tested via Symphonie satellites. In order to generate the spread spectrum signal, a pseudorandom sequence was used to spread the information directly. The bit rates of the transmitted digital signals were 600 bit sec and 50 bit sec. The M sequence, gold code and quick acquisition code were used as access code. Problems encountered when low bit rate digital signals are transmitted in the CDMA mode were studied and analyzed. Results show that this SSMA experimental system can work successfully by satellite and the established operating criteria are presented.
Author (ESA)

N81-23116# Indian Space Research Organization, Ahmedabad.
DIGITAL COMMUNICATION MULTIPLE ACCESS SCHEME c32
Pramod Kumar and A. K. Seth (Indian Post and Telegraph of India, New Dehli) *In* CNES Symphonie Symp. 1980 p 191-201 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A digital communication multiple access experiment was conducted between three ground stations, using a Symphonie satellite. The equipment design made use of a PCM-PSK-FDMA scheme for providing 30 telephone channels between any two of the three stations. The PCM-PSK-FDMA mode of satellite communication is depicted as one in which PCM baseband signals for different destinations were digitally multiplexed before being phase shift key modulated on an IF and upconverted to separate RF carriers for frequency division multiple access. This can be considered as an intermediate step between fully analog FDM-FM-FDMA as used all over the world and fully digital PCM-PSK-TDMA which is under development. The digital communication multiple access system is described along with the experiments conducted. Performance results are shown.
Author (ESA)

N81-23117# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
THE CELTIC SYSTEM: AN EXPERIMENT WITH SYMPHONIE [SYSTEME CELTIC. EXPERIMENTATION AVEC SYMPHONIE] c32
D. Lombard *In* CNES Symphonie Symp. 1980 p 203-220 refs In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

An FDMA system, using digital carriers with a speech concentrator is shown to provide significant channel capacity increase as compared to analog FDMA systems. A feasibility experiment using an FDMA/digital speech interpolator system and conducted with a link between Pleumeur-Bodou and Reunion Island via Symphonie is presented. The CELTIC numerical speech concentrator is described. Previous testing of CELTIC in real time on the TAT 6 transatlantic cable is discussed. Experiment results shot that for 120 voices over 60 digital channels carried by 4 by 2 Mbit/sec digital carriers (two each way) digital speech concentration provides a gain as compared to analog FDMA of 2 to 1. Author (ESA)

N81-23118# Post and Telegraph of India, New Delhi. Telecommunications Research Centre.
SINGLE CHANNEL PER CARRIER (SCPC) SCHEME FOR REMOTE AREA TELEPHONY c32
R. Seshan and D. Swaminathan *In* CNES Symphonie Symp. 1980 p 221-237 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A single channel per carrier (SCPC) experiment for remote and emergency communication services was conducted between three fixed and two transportable ground stations, using a Symphonie satellite. Two equipment designs were tested. Both SCPC units consisted of signal processing as well as IF conversion stages for the interface between speech/signal information and the IF/RF up-down-converters. The analog version of the equipment utilized a syllabic compressor-expandor FM scheme, while the digital version was based on a Delta modulation PSK

technique. A voice activated carrier feature was provided to conserve satellite power and reduce intermodulation noise. A carrier spacing of 45 kHz was used with automatic frequency control for downlink frequency corrections. Test results show the adequacy of both designs, with the FM unit able to tolerate higher frequency drifts. Author (ESA)

N81-23119# Philips Telecommunication Industries, Hilversum (Netherlands).

SINGLE CHANNEL PER CARRIER (SCPC) SCHEME: DELTA MODULATION. EXPERIMENTAL RESULTS c32

J. C. Leguyt *In* CNES Symphonie Symp. 1980 p 239-252 (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

Experimental results with a single channel per carrier (SCPC) system based on 32 kbit delta modulation combined with 4 phase PSK, using a small 4.5 meter ground station in conjunction with the Symphonie satellite, are presented. The tests included carrier to noise measurements, influences of environmental conditions, bit error rate measurements, automatic frequency and level control operation and speech intelligibility. The test setup, the ground station configuration, and parameters as used for the tests are briefly described. Results demonstrate the adequacy of digitally controlled delta modulated SCPC systems with voice operated carrier for providing high quality telephone connections via Symphonie satellites. Author (ESA)

N81-23120# AEG-Telefunken, Backnang (West Germany). Geschaeftsbereich Weitverkehr und Kabeltechnik.

SINGLE CHANNEL PER CARRIER (SCPC)-FM SYSTEM [SCPC-FM SYSTEME] c32

H.-P. Lier and J.-D. Buechs *In* CNES Symphonie Symp. 1980 p 253-264 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

Multiple access methods are summarized, then the design of a single channel per carrier (SCPC) system for telephone and radio transmission using frequency modulation is described. It is shown that the required transmission quality can be obtained by companding, emphasis control and with a voice operated carrier. The concepts chosen for the basic equipment, the carrier generation and the channel units are explained. The main points of the technical realization as well as the engineering design are dealt with in detail. Measurement results are given, and possible applications are shown. Author (ESA)

N81-23121# Post and Telegraph of India, New Delhi. Telecommunication Research Centre.

INTEGRATION OF SATELLITE CIRCUITS IN THE TERRESTRIAL TELECOMMUNICATION NETWORK c33

S. Satagopan *In* CNES Symphonie Symp. 1980 p 265-279 refs (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

The difficulties that arise from the integration of satellite circuits with a terrestrial telecom network, specifically with the compelled multifrequency (MF) signaling scheme as used by the trunk automatic exchanges in India, were studied. A network integration experiment was conducted, using satellite derived telephone channels on the Symphonie satellite. A semi-compelled MF signaling scheme in which the backward acknowledgement signal is sent in a pulse form, resulting in the signaling time (per information transfer) being completed in 850 msec as compared to 1300 msec for compelled operation, was tried and evaluated. A simplified network model is used to calculate and compare the post dialling delays between semi-compelled and fully compelled signaling procedures. The results as obtained in the experiments are presented. Substantial reduction in post dialing delay and register holding time is confirmed. Author (ESA)

N81-23122# Bell Telephone Mfg. Co., Antwerp (Belgium).

DESIGN AND IMPLEMENTATION OF A SMALL TERMINAL FOR THE EVEREST 78 EXPEDITION c14

Henri J. Gustin *In* CNES Symphonie Symp. 1980 p 281-288 (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

The generalized requirements underlying the design of small transportable satellite terminals to serve the needs of outside broadcast and emergency relief activities are discussed. These needs can be covered by a single unidirectional program channel and a few bidirectional telephone voice channels. The specific remote terminal design can be tailored to the operational environment likely to be encountered in such circumstances. After a review of essential transmission parameters, the Himalsat experiment as actually conducted in support of the Franco-German Everest expedition of 1978 is outlined, and interesting features of the small transportable terminal used are highlighted. Author (ESA)

N81-23123# Beijing Univ. (China). Dept. of Radio-Electronics.

CARRIER FREQUENCY STABILITY AND ITS EFFECT ON PHASE SHIFT KEYING SIGNALS IN THE SATELLITE CHANNEL c32

Liang Qinglin, Yang Tongli, and Liu Beiyian *In* CNES Symphonie Symp. 1980 p 289-299 refs (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

Total phase error was determined from measurements of carrier frequency stability in the Symphonie satellite channel and of several groups of typical parameters. The variation in frequency stability, observed at the local oscillator of the receiving terminal, of a 70 MHz terminal carrier transmitted via a satellite channel composed of a transceiver, a satellite transponder, and a propagation medium is described analytically. An M sequence code modulates the 70 MHz carrier by 2 PSK. The results of the measurements are given, and the optimal parameters of a second order loop are calculated for 2 DPSK and 2 PSK signal versus loop performance. Author (ESA)

N81-23124# Beijing Univ., Shijiazhuang Hebei (China). Communications Lab.

EXPERIMENTS WITH A LONG TIME DELAY PHASE-LOCKED LOOP VIA THE SATELLITE SYMPHONIE c32

Jiang Junzhang and Wu Longsu *In* CNES Symphonie Symp. 1980 p 301-316 refs (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

A 270 msec delay line which simulates the wave propagation time for a phase locked loop involving two-way transmission between a ground station and a satellite was developed. The loop is intended for a TDMA bit synchronization system. A linear model of a phase control system with time delay is presented. The simulation test and test setup are outlined. Results reveal large phase fluctuation which can degrade loop operation. A field test of the phase locked loop via the Symphonie satellite was organized. The effectiveness of the 270 msec delay line was examined along with the source of phase fluctuation. Results confirm the usefulness of the delay line for simulation while large phase fluctuation is shown to be mainly produced by internal noise from the variable crystal oscillator. Author (ESA)

N81-23125# Deutsche Bundespost, Darmstadt (West Germany). Forschungsinst.

ANALYSIS OF BRIEF DURATION LOSSES AND ERROR STRUCTURES IN SATELLITE LINKS [UNTERSUCHUNG VON KURZZEITAUSFAELLEN UND FEHLERSTRUKTUREN AUF SATELLITENSTRECKEN] c15

H.-J. Gelbrich *In* CNES Symphonie Symp. 1980 p 317-332 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

The importance of brief (in the microsecond range) interruptions when transmitting digital signals at high bit rates (100 Mbit/sec) is brought out, and the measurement of transmission failure duration is described. Resolution limits inherent with bit error rate as a means to failure determination are derived. A measurement method for the registration of failure structures is outlined. The measurement of failures with bit error rates of more than 6% in a test loop via the Symphonie satellite is considered for two failure events. Measurement in a link via Intelsat 4 is then recounted. The measurement results contain, in addition to the failures, also the time intervals of the bit errors. A portion of the bit errors measured is given by the noise limit of the system and forms a basic value of the bit error rate. The other portion are the deviations from this bit

error rate, a series of interferences. Failure structures at the PCM output of a TDMA system were also measured. Recurrent bit error patterns and failure frequencies are made apparent. Their causes are specified. Author (ESA)

N81-23126# Telediffusion de France, Pleumeur-Bodou.
ANALOG TELEVISION AND RADIO TRANSMISSION EXPERIMENTS [LES ESSAIS DE TRANSMISSION DE TELEVISION ANALOGIQUE ET RADIODIFFUSION SONORE] **c32**
Jacques Estivals *In* CNES Symponie Symp. 1980 p 333-341 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The electronic characteristics of the Symphonie satellites and associated ground stations which permit the transmission of high quality TV signals are cited, then TV and radio transmission experiments for the determination of optimal modulation parameters are described. The program of experiments lasted several months and involved both the Pleumeur-Bodou and Raisting stations. All tests were performed using both the SECAM and PAL standards, with a definition of 625 lines in both cases. Each transponder of each satellite was tested using several frequencies allocated within the respective transmission bandwidths. The carrier waves were frequency modulated. Experimental results lead to the definition of transmission standards, the successful use of which is reported. Author (ESA)

N81-23127# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
EXPERIMENTAL OPERATION OF A DIGITAL VIDEO TRANSMISSION SYSTEM [VERSUCHSBETRIEB MIT EINEM SYSTEM ZUR DIGITALEN FERNSEHBILD-UEBERTRAGUNG] **c32**
Roland Burkhardt *In* CNES Symphonie Symp. 1980 p 343-353 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Digital color video transmission via satellite with a bit rate of 34 Mbit/sec was performed. The coding of the video picture was done according to the principle of differential pulse code modulation. System development is described and measurement of operational characteristics is discussed. Data obtained during operation via the Symphonie system prove that this design for 34 Mbit/sec transmission results in a clear savings of transmission power as compared to the FM technique. Author (ESA)

N81-23128# Centre Commun d'Etudes de Television et de Telecommunications, Rennes (France).
DIGITAL TELEVISION TRANSMISSION EXPERIMENT VIA SYMPHONIE [EXPERIENCE DE TRANSMISSION DE TELEVISION NUMERIQUE PAR SYMPHONIE] **c32**
J. Ranquet *In* CNES Symphonie Symp. 1980 p 355-365 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Digital signals, including a color TV image and high quality channels, were transmitted. These signals originated at a facility in Rennes and were carried over various media (microwave links, cables) to Pleumeur Bodou where they were first phase modulated, then transmitted to the satellite. The signals were received in Venice by a transportable station equipped with an 8.8 m diameter antenna. This demonstration, and the preparatory experiments that paved the way for it, provided a further opportunity for checking the operation of the entire Symphonie satellite system. The results obtained suggest that the system could be regularly used for the transmission of digital TV signals, and that no major difficulties should be encountered. Author (ESA)

N81-23129# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
TESTS AND RESULTS OF INTEGRATED TV SOUND TRANSMISSION [VERSUCHE UND ERGEBNISSE MIT INTEGRIERTER FERNSEHTONUEBERTRAGUNG] **c32**
Roland Burkhardt *In* CNES Symphonie Symp. 1980 p 367-377 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The use of the vertical as well as the horizontal blanking intervals are utilized for the integration of several sound channels into a PCM signal is discussed. Several systems of this type were developed, and extensive tests with integrated TV stereo sound transmission were conducted via the Symphonie satellite. Results show that with this procedure, it is possible to transmit high quality TV associated sound without increasing the bandwidth of the video baseband. This gives an improved video signal to noise ratio, especially for satellite transmission. Author (ESA)

N81-23130# Post and Telegraph of India, New Delhi. Telecommunications Research Centre.
TELEVISION WITH MULTIPLE AUDIO FACILITY USING TIME DIVISION MULTIPLEXING **c32**
A. K. Seth and T. Rambilas (Indian Space Research Organization, Ahmedabad) *In* CNES Symphonie Symp. 1980 p 379-389 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A transmission experiment comprehending multilingual audiovisual TV programs with cue and commentary was conducted between three fixed ground stations. The equipment design makes use of a pulse amplitude modulation time division multiplexing (PAM-TDM) scheme to multiplex as many as six audio channels in the horizontal back portion of a black and white TV signal. The PCM-TDM scheme was also tried for multiplexing four audio channels in the horizontal signal back portion. Equipment trials were carried out via the Symphonie satellite. Results establish the adequacy of the equipment design for TV with a multiple audio facility. Sufficient transmitted sound quality is obtained, as defined for multilingual commentary applications.
Author (ESA)

N81-23131# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
COMPUTER NETWORKING EXPERIMENT VIA THE SYMPHONIE SATELLITE [RECHNERVERBUNDEXPERIMENT UEBER DEN SATILLITEN SYMPHONIE] **c62**
R. Lang and K. Simon (IBM, Stuttgart) *In* CNES Symphonie Symp. 1980 p 391-413 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The possibility of linking large computers in a high data rate network via a digital satellite system was studied experimentally. The use of satellites in a digital communication scheme is held to depend not only on the transmission parameters, but also considerably on the access system. This includes network control, synchronization at different levels, and matching to signal sources. The hardware and software configurations of the established Symphonie hookup are presented. A system model is developed highlighting the satellite network multiplexer synchronization method. The performance of this synchronization method as a function of the recorded error structure is described. Results for link efficiency and throughput efficiency are given.
Author (ESA)

N81-23132# Norwegian Telecommunications Administration Research Establishment, Kjeller.
PROPAGATION EFFECTS IN HIGH LATITUDES **c32**
O. Osen *In* CNES Symphonie Symp. 1980 p 415-423 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Transmission properties of communication systems using geostationary satellites are studied for ground station elevation angles < 5 deg. Radio experiments were carried out at elevation angles of 1.7 deg and 3.1 deg. Results are compared with signal fading theory. It is argued that the signal can be expressed as specular-plus-Rayleigh fading, or Rice fading. Furthermore, the fading rate is Gaussian distributed. Fading statistics confirm these hypotheses. The fading is probably due to a combination of scattering and reflections in turbulent layers and in internal waves in the atmosphere. Atmospheric attenuation is shown to be due to oxygen absorption, and this gives a significant increase in ground station noise temperature. Reliable (99.9 to 99.99%) satellite communication can be obtained, with a downlink fading margin of 4 to 8 dB in the summer months, and 1 to 3 dB in the winter (at 4 GHz). Uplink fading can effectively be coped with by uplink power control. Author (ESA)

N81-23133# First Research Inst. of PTT, Shanghai (China).
SIGNAL FLUCTUATIONS OBSERVED DURING THE SYMPHONIE EXPERIMENT **c32**
Zong Ruhou, Yang Meixiao, and He Mingjun (Beijing Earth Station, China) *In* CNES Symphonie Symp. 1980 p 425-434 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Severe signal level fluctuations were observed during the Symphonie experiment in China, especially at the Shanghai ground station which has the lowest elevation angle (6.4 deg) among participating Chinese ground stations. This is believed due to tropospheric path-induced signal scintillations. Typical strip chart recordings are shown and worst month statistics are given. The result correlates well with local meteorological data. Joint tests were also conducted with other stations in China. The results further confirm the signal scintillation hypothesis. Author (ESA)

N81-23134# Centre National d'Etudes Spatiales, Toulouse (France).
TWO-WAY TIME TRANSFERS BETWEEN NATIONAL RESEARCH COUNCIL (OTTAWA) AND PARIS OBSERVATORY VIA THE SYMPHONIE SATELLITE **c32**
M. Brunet *In its* Symphonie Symp. 1980 p 435-454 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The lack of precision and accuracy in time comparisons over distances of a few hundred to a few thousand kilometers is discussed for time metrology. Two-way time data transfer via geostationary, telecommunication satellites is then considered and experiments are cited. Two-way time links through the Symphonie satellite are described and uncertainties are analyzed. The estimation of corrections is treated. A time link experiment between a Canadian and a French station is recounted. Atomic clocks were used in order to maximize measurement precision. Results confirm that random and systematic uncertainties can be reduced to 1 nsec and 10 nsec, respectively. Author (ESA)

N81-23135# National Inst. of Metrology, Beijing (China).
CLOCK SYNCHRONIZATION EXPERIMENT VIA SYMPHONIE SATELLITE **c32**
Xiao Cuiying *In* CNES Symphonie Symp. 1980 p 455-466 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Clock synchronization experiments between ground stations in Shanghai and Beijing, and also Nanjing and Shanghai, were carried out. On the basis of these experiments, with two Cs atomic clocks located in Raisting (Federal Republic of Germany) and in Nanjing (China), synchronization experiments were conducted jointly via the Symphonie satellite. The experiments were performed with two-way relay noncoherent time transfer. Simultaneously, time comparison was made with transportable clocks. The experiments between Nanjing and Raisting show that the measured random fluctuation is about 10 nsec and that the accuracy of clock synchronization is better than 80 nsec. Experiments with transportable clocks, which were done simultaneously, confirm these results. Author (ESA)

N81-23136# Shanghai Observatory (China).
A TIME COMPARISON EXPERIMENT BETWEEN SHANGAI AND PARIS VIA SYMPHONIE SATELLITE **c32**
Jiang Dongrun, Cai Jinxiang, Song Jinan (Shaanxi Observatory, China), and Zheng Hengqin (Shaanxi Observatory, China) *In* CNES Symphonie Symp. 1980 p 467-475 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Precise time differences between the time scales of Shanghai, Shaanxi, and the Paris Observatory were determined while satellite time comparison capability was tested. In order to get high precision and accuracy, the two-way transmission of a TV type second signal was used in the experiment, and a special calibration of the differences in delay at emission and on reception was made at Hong-Qiao station in Shanghai. During the experiment, the station clock was linked with the master clocks of Shanghai and Shaanxi observatories by special microwave link and long wave signals. In France, the link between the Paris Observatory and Pleumeur-Bodov station was realized by the passive TV method. Although the experiment only lasted 10 days and was the first international comparison by means of the satellite technique for China, precision in time comparison of 8 nsec is obtained, and accuracy is estimated to the within 100 nsec. Author (ESA)

N81-23137# Technische Univ., Berlin (West Germany).
ACCEPTANCE AND OPERATION OF SMALL RECEIVING STATIONS IN URBAN AREAS [ABNAHME UND BETRIEB KLEINER EMPFANGSSTATIONEN IN GROSSSTAEDTISCHER UMGEBUNG] **c14**
P. Hartl, G. Boeck, and N. Gieschen *In* CNES Symphonie Symp. 1981 p 477-497 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A small receiving station with a 5.7 m parabolic antenna installed on top of a 65 m high building in the center of Berlin was equipped to receive Symphonie signals. The calibration of the ground station, with the Sun and the satellite as reference signals, is discussed. The nature and position of surrounding man-made noise sources are identified, and their effects on reception of Symphonie radio signals in the 4 GHz range are described. Author (ESA)

N81-23138# Indian Space Research Organization, Ahmedabad.
TRANSPORTABLE TERMINALS FOR STEP **c14**
S. Barathy, P. Panicker, S. S. Palsule, and K. Narayanan *In* CNES Symphonie Symp. 1980 p 499-509 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Two mobile ground stations which were used during the Satellite Telecommunications Experiments Project (STEP) are described. These are the transportable remote area communication terminal (TRACT) and the emergency communication terminal. The TRACT unit is housed in a van built on a 7.5 t chassis, while the ECT is transported by a jeep. The TRACT facility is equipped for TV transmissions and telecommunications. The ECT, which can be airlifted, has a two voice channel capability. Fabrication and field testing of these units are outlined. Technical specifications, construction details, performance and operational characteristics are given. Author (ESA)

N81-23139# AEG-Telefunken, Backnang (West Germany).
HIGHLY MOBILE EARTH STATIONS **c14**
Heinz Wollenhaupt and Bernd Abt (Dornier-Werke G.m.b.H., Friedrichsafen, West Germany) *In* CNES Symphonie Symp. 1980 p 511-522 (For primary document see N81-23101 14-12) (Contract BMFT-01YX16-ZK-WRT-5007)
Avail: NTIS HC A99/MF A01

The development and construction of transportable ground stations in support of the Symphonie utilization program are described. The station layout includes a 3.3 m, or 4.5 m, light weight, glass fiber reinforced parabolic cassegrain antenna and associated equipment shelter. The unit can be erected within 2 hours by three men. Performance data for the system are given, highlighting superior results for the antenna reference diagram. A special feed system is used to improve the radiation pattern around the nominal angle of elevation, i.e., spill over is avoided in the range 5 to 40 deg. The system, depending on dish diameter, is capable either of transmitting four voice channels or of receiving one TV channel in the 4/6 GHz band.
Author (ESA)

N81-23140# Centre National d'Etudes des Telecommunications, Lannion (France).
TRANSPORTABLE GROUND STATIONS [LES STATIONS TERRIENS TRANSPORTABLES] **c14**
J. Y. LHonnen *In* CNES Symphonie Symp. 1980 p 523-533 refs In FRENCH; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Transportable ground stations, particularly those used in experiments conducted by France as part of the Symphonie program, are discussed. The optimization of equipment parameters is described, covering quality factor, antenna design and associated telecommunication equipment. The optimal layout for infrastructures and operational management are then considered. The SAMSON program in Nairobi, Kenya is cited as an example. The establishment of a pool of transportable ground stations in

France as support for space communications systems is brought up, and station capabilities are listed. Author (ESA)

N81-23141# Societe Toulousaine d'Etudes et Realisations Electroniques et Mecaniques, Castanet (France).
STEP TRACKING SYSTEM [SYSTEME DE POURSUITE PAS A PAS] c14
J. P. Renard *In* CNES Symphonie Symp. 1980 p 535-539 ref In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

With the increase in the inclination of the orbits of the two Symphonie satellites, the utilization Symphonie communications links demands that the steerable parabolic antennas of the Earth station be equipped with automatic tracking equipment. The stepping type system developed has excellent operational flexibility, ease of operation and direct readout of status parameters. The original equipment specification is reviewed and test results using the equipment are presented. Author (ESA)

N81-23142# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
AUTONOMOUS ANTENNA TRACKING SYSTEM FOR MOBILE SYMPHONIE GROUND STATIONS [AUTONOMES ANTENNENNACHFUEHRSYSTEM FUER SYMPHONIE-BODENSTATIONEN] c14
K. Ernsberger, G. Lorch, and E. Waffenschmidt *In* CNES Symphonie Symp. 1980 p 541-552 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The implementation of a satellite tracking and antenna control system is described. Due to the loss of inclination control for the Symphonie satellites, it became necessary to equip the parabolic antennas of the mobile Symphonie ground stations with tracking facilities. For the relatively low required tracking accuracy of 0.5 dB a low cost, step track system was selected. The step track system developed for this purpose and tested over a long period of time in seven ground stations is based on a search step method with subsequent parabola interpolation. As compared with the real search step method, the system has the advantage of a higher pointing angle resolution, and thus a higher tracking accuracy. When the pilot signal has been switched off for a long period of time, as for instance after the eclipse, the antenna is repointed towards the satellite by an automatically initiated spiral search scan. The function and design of the tracking system are detailed, while easy handling and tracking quality are demonstrated by operational results. Author (ESA)

N81-23143# European Space Operations Center, Darmstadt (West Germany).
STATIONKEEPING EXPERIENCE WITH OTS c13
A. S. Fagg *In* CNES Symphonie Symp. 1980 p 553-566 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The experience accumulated in maintaining the OTS satellite in geosynchronous orbit is recounted. The objectives of the OTS mission, along with satellite description, are related to the OTS stationkeeping strategies and details of implementation maneuvers. Orbit determination and obtainable accuracy are discussed. Results achieved demonstrate that the stationkeeping strategies work in orbit, although in certain instances improvement was required to minimize longitude and latitude variation to within the + or - 0.1 deg deadbands. Large pitch torques observed during north-south maneuvers are satisfactorily explained by plume impingement on the solar array panels, and are accommodated by modifiying procedures albeit with the penalty of greatly increased operational complexity. Nonetheless, the integrity of the OTS design concept is clearly shown. Author (ESA)

N81-23144# Consiglio Nazionale delle Ricerche, Rome (Italy).
SIRIO IN-ORBIT CONTROL c13
A. Foni, E. Letico, and G. Pasquinelli *In* CNES Symphonie Symp. 1980 p 567-584 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The techniques used to control the SIRIO satellite during its operational life are explained. The background of the project and the mission objectives are given, while the spacecraft and the operating ground support systems are described. Spacecraft attitude/orbit determination and control are considered as well as the experience gained by the flight dynamics group in controlling the satellite, and in geostationary spin stabilized spacecraft management and control. Onboard subsystems performance is illustrated. Author (ESA)

N81-23145*# Communications Research Centre, Ottawa (Ontario). Dept. of Communications.
ON-ORBIT CONTROL OF THE COMMUNICATIONS TECHNOLOGY SATELLITE (CTS)/HERMES c13
H. R. Raine *In* CNES Symphonie Symp. 1980 p 585-614 refs Sponsored in part by NASA (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01 CSCL 22B

A variety of control functions for the CIS HERMES satellite are reviewed. Its mission, to demonstrate high power SHF (12 GHz) transmission is discussed. The satellite was controlled in geostationary orbit for nearly four years from the satellite control center in Ottawa, Canada. Highlights of these operations are outlined. The interactions between many of the automatic onboard control functions and control from the ground are described. Special emphasis is placed on the characteristics and performance of the three axis attitude control system.
Author (ESA)

N81-23146# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). German Space Operations Center.
ORGANIZATION AND OPERATIONAL CONFIGURATION OF THE SYMPHONIE GROUND CONTROL SYSTEM c14
B. Ebel and G. Cales (CNES, Toulouse) *In* CNES Symphonie Symp. 1980 p 615-632 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The organization of Symphonie mission operations, particularly, control operations for the two orbiting spacecraft, is presented. Both satellites are the common responsibility of the German and French space agencies. The characteristic features of the two control centers (SYNCON located near Munich and COSY located at the Toulouse Space Center) are given with respect to antennas, communication links, computers, and the software developed for quick look at housekeeping data, attitude/orbit determination and control as well as for off-line spacecraft performance analysis. Results obtained are used to emphasize the effectiveness of bilateral project coordination.
Author (ESA)

N81-23147# Centre National d'Etudes Spatiales, Toulouse (France).
SYMPHONIE ORBIT: DETERMINATION AND ORBIT; MANOEUVRE ACTIVITIES c13
P. Legendre and F. Deixelberger (DFVLR, Oberpfaffenhofen, West Germany) *In its* Symphonie Symp. 1980 p 633-677 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The characteristics and results of the most important transfer positioning, and in orbit maneuvers are presented. Maneuver optimization is stressed because of the significant fuel consumption of positioning and inclination correction maneuvers during the stationkeeping phase. Maneuver strategies and the optimization and carrying out of all types of stationkeeping maneuvers are surveyed. Regular orbit control by orbit determination and prediction is shown essential to mission specifications and to maneuver preparation and satellite range control. The frequency of orbit determination and the workload on tracking stations is dependent on the accuracy to which the orbit must be known for stationkeeping operations. Thanks to the shifting of Symphonie to a position over the Indian Ocean, experimental data concerning the effects of the Earth's gravitational field on ground operations are available, and analysis results are given.
Author (ESA)

N81-23148# Centre National d'Etudes Spatiales, Toulouse (France).
METHODS AND TECHNIQUES USED FOR SYMPHONIE ATTITUDE DETERMINATION AND CONTROL c15
M. Burello, E. Schmidt, J. Foliard, J.-M. Robert, and W. Messner

In its Symphonie Symp. 1980 p 679-714 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The methods used for nominal attitude operations, including attitude determination in spin phase, spin axis slewing, acquisition of three axis mode, attitude determination and attitude control during three axis phase, are described. In particular, the strategy developed for optimizing the routine pitch axis correction is derived, taking into account operational constraints. Facilities used on the ground to verify the performance of the stabilization hardware and control software are described. Some non-nominal attitude control modes are then considered. The methods used for reacquisition of nominal attitude after loss of three axis stabilization, which occurred twice in connection with operating the defective hot-gas system, are included. Author (ESA)

N81-23149# Centre National d'Etudes Spatiales, Toulouse (France).
SYMPHONIE: IN-FLIGHT PERFORMANCE OF TELEMETRY-TELECOMMAND, POWER SUPPLY, THERMAL CONTROL AND TRANSPONDER SUBSYSTEMS **c17**
P. Debay, J.-J. Dechezelles (SNIAS, Cannes, France), and G. Seeck (DFVLR, Oberpfaffenhofen, West Germany) *In its* Symphonie Symp. 1980 p 715-731 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The behavior of subsystems essential to the continuation of the Symphonie A and B missions is reviewed for 5 years operation. To date, the telemetry/remote command subsystems are internally trouble free and the SHF dedicated links have proved to be a safe alternative to VHF ones when interference problems with other spacecraft occur. The solar generators deliver full mission power, but aging is more important than expected on Symphonie A. The Ni-Cd batteries show a similar capacity decay, which clearly appeared after 2 years in orbit. The thermal control compares very accurately with mathematical modelling. However, an increase in the upper temperature amounting to 4 C per year is noticed. It is assumed to be the effect of a decrease in the optical reflectance of the solar cells. The transponders continue to operate very satisfactorily. Some unexpected changes in electrical status are noted which are explained by space charging phenomenon. The occurrence of such events has dropped considerably. Two electronic units and one battery failed. Operations were continued with redundant equipment.
Author (ESA)

N81-23150# Centre National d'Etudes Spatiales, Toulouse (France).
SUMMARY OF OPERATING EXPERIENCE WITH THE SYMPHONIE SATELLITES **c15**
G. Cales, J.-J. Dechezelles (SNIAS, Cannes, France), and B. Ebel (DFVLR, Oberpfaffenhofen, West Germany) *In its* Symphonie Symp. 1980 p 733-742 Partly in ENGLISH and FRENCH (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Experience gained by the French and German ground control centers during Symphonie in orbit operations is summarized. The particularities of ground control of geostationary telecommunications satellites are reviewed. An analysis of the workload associated directly with the design of the Symphonie spacecraft and ground operations systems is then presented. Special attention is given to flexibility in spacecraft design with regard to backup modes and the use of redundancy. Identification of spacecraft design features that result in inadequate workloads on the ground is discussed in terms of ease of analysis of degraded operation and anomalies as well as regarding protection against ground control handling errors. Improvements that could be introduced into the design of future spacecraft and ground operation systems are suggested. Author (ESA)

N81-23151# Centre National d'Etudes Spatiales, Toulouse (France).
IN-ORBIT CONTROL OF GEOSTATIONARY SATELLITES. PANEL DISCUSSION C **c13**
In its Symphonie Symp. 1980 p 741-742 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Topics discussed include cooperation between the satellite components manufacturers and the agency in charge of satellite operations, international regulations concerning satellite operations, and trends in satellite design and their implications on satellite control. Author (ESA)

N81-23152# Deutsche Welle, Cologne (West Germany). Technische Direktion.
SATELLITE TRANSMISSION SERVING RADIO AND TELEVISION [SATELLITENUEBERTRAGUNGEN IM DIENSTE VON RUNDFUNK UND FERNSEHEN] **c32**
Heiner Hartmann *In* CNES Symphonie Symp. 1980 p 745-750 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Satellite transmission links established as part of the Symphonie utilization program must meet certain specifications from the radio broadcaster's point of view. It is not sufficient that a transmission link exists, it also has to be readily available for reasons of expediency. In addition, a transmission link must provide the best possible signal quality. These requirements apply equally to radio and television. Intercontinental TV transmissions, for example, are only possible by satellite transmission. The transmission of radio programs to Kigali, Rwanda, radio transmitted reports from the Himalayas and TV equipments with the Ivory Coast, Iran, Egypt, China and Guadeloupe are some of the best examples of operatons of this kind within the Symphonie program. Author (ESA)

N81-23153# Ministere des Affaires Etrangeres, Paris (France).
SATELLITES AND COMMUNICATIONS: TRANSMISSIONS BETWEEN FRANCE AND QUEBEC VIA SYMPHONIE [SATELLITES ET COMMUNICATIONS: LES ECHANGES FRANCO-QUEBECOIS PAR SYMPHONIE] **c32**
Odile LeFranc *In* CNES Symphonie Symp. 1980 p 751-758 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

During the years 1976 to 1979, the Symphonie satellites provided duplex video communication links between France and Quebec. A methodology for satellite utilization in the cultural, scientific and educational domains, and particularly with regard to video conference workshops and information exchange between researchers and teachers, was sought. Although solutions still have to be found to many problems raised by the utilization of auxiliary media, electronic archiving, automatic consultation of data banks and supplementary media, not to mention connected networks, it can already be anticipated that, thanks to Symphonie, future satellite systems will reach the stage where such services will be considered commonplace. Author (ESA)

N81-23154# Eurospace, Paris (France).
STUDIES AND EXPERIMENTS BY EUROSPACE IN THE FIELD OF EDUCATION AND PUBLIC SERVICE [ETUDES ET EXPERIMENTATIONS D'EUROSPACE DANS LE DOMAINE DE L'EDUCATION ET DU SERVICE PUBLIC] **c85**
M. Y. Demerliac *In* CNES Symphonie Symp. 1980 p 759-768 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Several quasi-operational projects are described which are capable of leading to industrial or service contracts. Specific emphasis is given to the following: The ESOPE 1 rural education project; a TV distribution project; an economic distribution project; and the European commercial. R.C.T.

N81-23155# Ministere de l'Education Primaire et de la Television Educative, Abidjan (Ivory Coast). Programme d'Education Televisuelle.
OUTCOME OF SYMPHONIE EXPERIMENTS IN IVORY COAST [BILAN DES EXPERIMENTATIONS SYMPHONIE EN COTE D'IVOIRE] **c32**
Francis Billot-Piot *In* CNES Symphonie Symp. 1981 p 769-773 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Several telecommunications experiments involving the transmission of educational and cultural TV programs via the Symphonie satellite are described. The organization of the program

encompassing these experiments is briefly summarized and the principle themes of the various transmissions are given. An assessment of the effectiveness of satellite television is also included. R.C.T.

N81-23156# Association Universitaire pour le Developpement de l'Enseignement et de la Culture en Afrique et a Madagascar, Paris (France).
SYMPHONIE PROGRAM PLANNED FOR IVORY COAST 1979 - 1980 [PROGRAMME PREVISIONNEL SYMPHONIE COTE D'IVOIRE 1979 - 1980] c80
Regine Thomas *In* CNES Symphonie Symp. 1980 p 775-786 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The planning of teaching and scientific research activities using the Symphonie system is described. The program involves roughly 100 hr of satellite time including 20 hr of video transmission, 60 hr of audio and graphics transmission, and 20 hr use of a computer network data link. The project particularly makes use of comprehensive multimedia, including video conferences, transmission of audiovisual documents, audiographic teleconference links and data transmission. The educational potential of real time, satellite multimedia teleconferencing is emphasized. Author (ESA)

N81-23157# United Nations Educational, Scientific and Cultural Organization, Paris (France).
THE EXPERIMENTAL USE OF THE SYMPHONIE SATELLITE DURING THE 19TH SESSION OF THE GENERAL CONFERENCE - UNESCO c32
W. Seeger *In* CNES Symphonie Symp. 1980 p 787-790 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The extent the use of a communication satellite link could enable the UNESCO secretariat and the permanent delegations remaining in Paris to be directly associated with the conference activities in Nairobi was determined. The utility of the various facilities (telephone, telex, facsimile, data transmission, radio and visiophone) for the improvement of conference services was evaluated. The use of the system as an aid to press and broadcasting services was also evaluated. Author (ESA)

N81-23158# United Nations, New York, N. Y.
SYMPHONIE EXPERIMENTS AND FUTURE APPLICATIONS OF TELECOMMUNICATIONS SATELLITES FOR THE UNITED NATIONS NETWORK c85
Yoshio Tagaya *In* CNES Symphonie Symp. 1980 p 791-803 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Various aspects of the United Nations/Symphonie experiments are described. The operational characteristics of ground station equipment and the Symphonie satellite circuits under field conditions are discussed. Field operational capabilities in relation to United Nations peace keeping requirements are assessed. The replacement of the Raisting station and the 3 m station in Jerusalem by three 4.5 m ground stations is considered. A 3.3 m station is evaluated for emergency use for disaster relief or other humanitarian requirements. The possible establishment of a satellite communications link between Geneva and Nairobi is also considered. R.C.T.

N81-23159# Deutsches Rotes Kreuz, Bonn (West Germany). Generalsekretariat.
DISASTER RELIEF COMMUNICATIONS VIA THE SYMPHONIE SATELLITE [KATASTROPHENHILFE UEBER SATELLIT SYMPHONIE] c32
Wilhelm Straetmans *In* CNES Symphonie Symp. 1980 p 805-808 In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Experience gained by the German Red Cross in the operation of a 3.3 m ground station, using satellite telecommunications to coordinate their disaster relief efforts is reported. The advantages of a properly functioning telecommunication network, available to allow initiation of well-intentioned support of relief measures, are illustrated. apparent. Author (ESA)

N81-23160# Direction Generale des Telecommunications, Pleumeur-Bodou (France).
TELECOMMUNICATIONS SERVICES FOR SPECIAL EVENTS [LES SERVICES OCCASIONNELS DE TELECOMMUNICATIONS PAR SATELLITE] c14
Michel Picaud *In* CNES Symphonie Symp. 1980 p 809-814 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Different configurations of transportable ground stations which make accessible occasional, long distance telecommunication services via satellite links are described. The use of small antennas, reduction in the size of telecommunications equipment and its installation in easily transportable small containers are cited as conditions of such operations. The importance of satellite communication for news coverage, data exchanges, and other temporary communication activities is discussed. Author (ESA)

N81-23161# Centre National d'Etudes Spatiales, Toulouse (France).
PUBLIC SERVICE. PANEL DISCUSSION D c32
In its Symphonie Symp. 1980 p 815-818 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The service options of satellite communication systems are discussed with respect to identifying the satellite system configuration which best meets the service requirements. Concrete examples of public service are given, with special emphasis on educational applications. R.C.T.

N81-23162# AEG-Telefunken, Ulm (West Germany).
THE TRAVELLING WAVE TUBE TL 4003 AND FURTHER DEVELOPMENT OF TWT [DIE WANDERFELDROEHRE TL 4003 UND DIE WEITEREN ENTWICKLUNGEN VON SATELLITENWANDERFELDROEHREN] c33
Jork Bretting *In* CNES Symphonie Symp. 1980 p 819-833 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The traveling wave tube (TWT) for the Symphonie satellite is described. The effect of TWT design on telecommunications satellite characteristics is discussed. The impact on satellite lifetime and reliability as well as on the quality of transmissions is illustrated. The influence of the TWT on power consumption and thermal control is discussed. Increasing the efficiency with multistage collector tubes up from 30% to 52% is considered along with increasing output power for TV satellites at 12 GHz and 20 GHz. The limits and possibilities for future developments in this field are briefly assessed. Author (ESA)

N81-23163# Messerschmidt-Boelkow G.m.b.H., Munich (West Germany).
APPLICATION OF SYMPHONIE EXPERIENCES IN FOLLOW-UP PROJECTS AT MBB c15
W. Goeschel and J. Hellweg *In* CNES Symphonie Symp. 1980 p 835-850 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The technology of three axis stabilization and bipropellant propulsion systems for Symphonie as well as improvements in follow on projects are described. The three axis attitude control system of Intelsat V is a derivation of the Symphonie stabilization system, improved for higher accuracies and adapted to a heavy satellite with large flexible solar arrays. The Symphonie bipropellant technology is applied in the Galileo project, a joint US-German program for the exploration of Jupiter. The Symphonie 10 and 400 N engines are used with small modifications, but are now served by a common feed and tank system (unified system). The direct broadcasting satellite TV-SAT uses Symphonie technology to a large extent. Three axis attitude control, which has to assure very high antenna pointing accuracies, is still based on the Symphonie bias momentum principle with ball bearing supported flywheels. Optical sensor technology is also derived from Symphonie. Author (ESA)

N81-23164# Nanjing Radio Factory (China).
TRANSMISSION PARAMETERS OF FDM/FM/FDMA TELEPHONE AND FM TELEVISION FOR DOMESTIC SATELLITE SYSTEM IN CHINA BASED ON THE EXPERI-

MENT RESULTS VIA SYMPHONIE **c32**
Wang Lihua *In* CNES Symphonie Symp. 1980 p 851-865 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Suitable transmission parameters for an experimental satellite communications system were calculated, and verified by transmission tests via the Symphonie satellite. The experimental system is assumed to be power limited with a low EIRP. The design configurations and results of the tests were evaluated. A noncryogenic parametric amplifier was implemented in the ground station. Results led to the selection of analog telephone modulation parameters and over deviation reception for television.
Author (ESA)

N81-23165# Societe Anonyme d'Etudes et Realisations Nucleaires, Limeil-Brevannes (France).
THE ATTITUDE SENSORS ON SYMPHONIE AND THEIR SUBSEQUENT DEVELOPMENT [LES SENSEURS DE TERRE DU SATELLITE SYMPHONIE ET LEURS DEVELOPPEMENTS ULTERIEURS] **c15**
H. Bourcier, F. Desvignes, and F.-X. Doittau *In* CNES Symphonie Symp. 1980 p 867-882 refs In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Attitude measurement onboard Symphonie spacecraft by Sun and Earth sensors is described. Attitude measurement and control for the spin and three axis stabilization modes are analyzed. Operational results deduced through telemetry data processing are given; they confirm the predicted performance and the proper operation of the equipment. The implementation of derivatives of this equipment onboard Meteosat and Intelsat 5 is reported. Further improved versions developed for Aerosat and for OTS are mentioned. The prospects for continued application of this sensor are assessed.
Author (ESA)

N81-23166# Societe Nationale Industrielle Aerospatiale, Cannes (France).
THERMAL CONTROL OF SYMPHONIE [LE CONTROLE THERMIQUE DE SYMPHONIE] **c15**
Charles Carton *In* CNES Symphonie Symp. 1981 p 883-900 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The development and implementation of the thermal control system onboard Symphonie are described. The Symphonie mission imposed severe constraints on the thermal control system, particularly as a result of the necessity to take into account two fundamentally different phases concerning both the satellite configuration and onboard equipment modes of operation. The various innovative features of the Symphonie thermal control system are disccussed in terms of certain technological developments and substantial analytical studies.
Author (ESA)

N81-23167# Direction Generale des Telecommunications, Pleumeur-Bodou (France).
THE FRENCH SATELLITE TELECOMMUNICATIONS PROGRAM: TELECOM 1 [LE PROGRAMME NATIONAL FRANCAIS DE TELECOMMUNICATIONS PAR SATELLITE TELECOM 1] **c32**
Michel Popot *In* CNES Symphonie Symp. 1980 p 901-910 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A satellite telecommunications system, Telecom 1, is proposed. The system is designed to meet general communications needs as well as those of large firms operating in France. The Telecom 1 system includes two orbiting satellites and has two main missions: (1) an intracompany link mission for high speed, broadband transfer of digital data between the different facilities of subscribing companies; and (2) a misson of providing conventional telecommunications links between continental France and its overseas territories. Satellite and ground station equipment are also described.
Author (ESA)

N81-23168# Indian Space Research Organization, Bangalore.
INDIAN DOMESTIC SATELLITE (INSAT) SYSTEM **c15**
P.-P. Kale, M.-L. Rawal (Indian Post and Telegraph Dept., New Delhi), and J. Basu (Indian Post and Telegraph Dept., New Delhi) *In* CNES Symphonie Symp. 1980 p 911-924 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

The proposed Indian domestic satellite system is described. It is planned for multipurpose applications, comprising telecommunication, direct TV broadcast and meteorological service with national coverage. The communication transponders are designed for 6/4 GHz, direct TV broadcast for 6/2.5 GHz, and meteorological data relay for 0.4/4 GHz bands. The meteorological payload includes a very high resolution radiometer with a downlink frequency of a 4 GHz for cloud and Earth imaging. The ground segment is planned as five large ground stations, thirteen medium stations and ten small stations. A few transportable terminals are also included. Telecommunication is planned with FDM-FM modulation for large traffic centers and FM-SCPC modulation for remote areas.
Author (ESA)

N81-23169# Department of Communications, Ottawa (Ontario).
COMMUNICATION SATELLITES IN CANADA **c15**
J. D. Palmer *In* CNES Symphonie Symp. 1980 p 925-940 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A brief history of the Canadian involvement with domestic communications satellites is presented. Canada is the first country to deploy, through Telesat Canada, a geostationary domestic satellite system. This system, ANIK-A, operates within the 6/4 GHz band, and provides both telephony and television distribution. The limitations of the 6/4 GHz band prompted the Canadian government to join NASA and ESA in the design and construction of an experimental satellite operating in the 14/12 GHz band. The resulting spacecraft (CTS/HERMES) was used in 36 different Canadian Communications experiments. The experiments included were: telemedicine; teleeducation; community communications; administration; and satellite television broadcasting.
Author (ESA)

N81-23170# Centre National d'Etudes Spatiales, Toulouse (France).
THE FRENCH GERMAN BROADCASTING SATELLITE PROGRAM **c15**
A. Pouzet and B. Fabis (DFVLR, Cologne) *In its* Symphonie Symp. 1980 p 941-945 Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A cooperative program for development, fabrication and launching of two satellites for television broadcasting over France and Germany is presented. This cooperation which continues that of the Symphonie program, is intended to result in Franco-German preoperational national broadcasting satellite systems and to form a joint Franco-German industrial team to deal with the export market in the field of broadcasting satellites. The program objectives, system requirements and the basic technical characteristics of the common Franco-German spacecraft are described.
Author (ESA)

N81-23171# Institut fuer Rundfunktechnik, Munich (West Germany).
SYMPHONIE EXPERIENCE AND SELECTION OF BROADCASTING STANDARDS FOR DIRECT BROADCASTING SATELLITE SYSTEMS [DE L'EXPERIENCE SYMPHONIE A LA DEFINITION DE NORME POUR UN SYSTEME DE RADIO DIFFUSION PAR SATELLITE] **c32**
R. Sueverkruebbe and D. PhamTat (Telediffusion de France) *In* CNES Symphonie Symp. 1980 p 947-962 In FRENCH and GERMAN (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

Equipment developed especially for Symphonie satellite experiments for the frequency multiplexing of a video signal and several sound subcarriers are described. Various standards for the utilization of the 12 GHz band with regard to operational national direct broadcasting satellite systems are proposed.
R.C.T.

N81-23172# Centre National d'Etudes Spatiales, Toulouse (France).
REQUIREMENTS FOR DOMESTIC AND REGIONAL TELECOMMUNICATIONS SATELLITES: PANEL DISCUSSION E **c15**

In its Symphonie Symp. 1980 p 963-967 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

A review of telecommunications satellite development is given. The relationship between the pace of this development and user requirements, as well as the prospects for continuing development in response to the ever increasing need for telecommunications services are considered. R.C.T.

N81-23173# Los Alamos Scientific Lab., N. Mex.
ROLE OF MILITARY SCIENTISTS AND ENGINEERS IN SPACE (1980-2000)
Joseph A. Angelo, Jr. 1981 20 p refs Presented at the Mil. Space Doctrine Symp., Colorado Springs, Colo., 1-3 Apr. 1981 (LA-UR-81-192; CONF-810418-1) Avail: NTIS HC A02/MF A01

The reusable Shuttle/Spacelab configuration permits a more effective use of the human and material resources being committed to the space program in the next decade, and ensures the presence of man in space on a routine basis. However, full scale exploitation of space for national defense will depend to a great extent on the skillful and successful utilization of the military payload specialists who will fly and operate various Shuttle based Department of Defense (DoD) experiments. The doctrine, role function, and training requirements for DoD payload specialists are explored. The unique advantage of man in The loop activities and the orbiting military scientist conducting experiments in situ is addressed in light of previous U.S. manned space flight experience and the projected capabilities of the Shuttle. DOE

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N81-23143# European Space Operations Center, Darmstadt (West Germany).
STATIONKEEPING EXPERIENCE WITH OTS
A. S. Fagg *In* CNES Symphonie Symp. 1980 p 553-566 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23144# Consiglio Nazionale delle Ricerche, Rome (Italy).
SIRIO IN-ORBIT CONTROL
A. Foni, E. Letico, and G. Pasquinelli *In* CNES Symphonie Symp. 1980 p 567-584 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23145*# Communications Research Centre, Ottawa (Ontario). Dept. of Communications.
ON-ORBIT CONTROL OF THE COMMUNICATIONS TECHNOLOGY SATELLITE (CTS)/HERMES
H. R. Raine *In* CNES Symphonie Symp. 1980 p 585-614 refs Sponsored in part by NASA (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01 CSCL 22B

N81-23147# Centre National d'Etudes Spatiales, Toulouse (France).
SYMPHONIE ORBIT: DETERMINATION AND ORBIT; MANOEUVRE ACTIVITIES
P. Legendre and F. Deixelberger (DFVLR, Oberpfaffenhofen, West Germany) *In its* Symphonie Symp. 1980 p 633-677 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23151# Centre National d'Etudes Spatiales, Toulouse (France).
IN-ORBIT CONTROL OF GEOSTATIONARY SATELLITES. PANEL DISCUSSION C
In its Symphonie Symp. 1980 p 741-742 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N81-23107# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany).
THE SYMPHONIE GROUND STATIONS [DIE SYMPHONIE - ERDEFUNKSTELLEN]
A. Cartier and P. Okolowitz *In* CNES Symphonie Symp. 1980 p 73-78 In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23122# Bell Telephone Mfg. Co., Antwerp (Belgium).
DESIGN AND IMPLEMENTATION OF A SMALL TERMINAL FOR THE EVEREST 78 EXPEDITION
Henri J. Gustin *In* CNES Symphonie Symp. 1980 p 281-288 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23137# Technische Univ., Berlin (West Germany).
ACCEPTANCE AND OPERATION OF SMALL RECEIVING STATIONS IN URBAN AREAS [ABNAHME UND BETRIEB KLEINER EMPFANGSSTATIONEN IN GROSSSTAEDTISCHER UMGEBUNG]
P. Hartl, G. Boeck, and N. Gieschen *In* CNES Symphonie Symp. 1981 p 477-497 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23138# Indian Space Research Organization, Ahmedabad.
TRANSPORTABLE TERMINALS FOR STEP
S. Barathy, P. Panicker, S. S. Palsule, and K. Narayanan *In* CNES Symphonie Symp. 1980 p 499-509 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23139# AEG-Telefunken, Backnang (West Germany).
HIGHLY MOBILE EARTH STATIONS
Heinz Wollenhaupt and Bernd Abt (Dornier-Werke G.m.b.H., Friedrichsafen, West Germany) *In* CNES Symphonie Symp. 1980 p 511-522 (For primary document see N81-23101 14-12) (Contract BMFT-01YX16-ZK-WRT-5007)
Avail: NTIS HC A99/MF A01

N81-23140# Centre National d'Etudes des Telecommunications, Lannion (France).
TRANSPORTABLE GROUND STATIONS [LES STATIONS TERRIENS TRANSPORTABLES]
J. Y. LHonnen *In* CNES Symphonie Symp. 1980 p 523-533 refs In FRENCH; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23141# Societe Toulousaine d'Etudes et Realisations Electroniques et Mecaniques, Castanet (France).
STEP TRACKING SYSTEM [SYSTEME DE POURSUITE PAS A PAS]
J. P. Renard *In* CNES Symphonie Symp. 1980 p 535-539 ref In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23142# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
AUTONOMOUS ANTENNA TRACKING SYSTEM FOR MOBILE SYMPHONIE GROUND STATIONS [AUTONOMES ANTENNENNACHFUEHRSYSTEM FUER SYMPHONIE-BODENSTATIONEN]
K. Ernsberger, G. Lorch, and E. Waffenschmidt *In* CNES Symphonie Symp. 1980 p 541-552 In GERMAN; ENGLISH

summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23146# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). German Space Operations Center.
ORGANIZATION AND OPERATIONAL CONFIGURATION OF THE SYMPHONIE GROUND CONTROL SYSTEM
B. Ebel and G. Cales (CNES, Toulouse) *In* CNES Symphonie Symp. 1980 p 615-632 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23160# Direction Generale des Telecommunications, Pleumeur-Bodou (France).
TELECOMMUNICATIONS SERVICES FOR SPECIAL EVENTS [LES SERVICES OCCASIONNELS DE TELECOMMUNICATIONS PAR SATELLITE]
Michel Picaud *In* CNES Symphonie Symp. 1980 p 809-814 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N81-23174*# Kansas Univ., Lawrence.
PIONEER VENUS PROBE MODELS INSTRUMENTED PROP TESTS Final Report
Vincent U. Muirhead Aug. 1978 74 p refs
(Contract NAS2-9414)
(NASA-CR-164298; KU-FRL-333-1) Avail: NTIS HC A04/MF A01 CSCL 22B

Models of both the small and large Pioneer Venus probes were dropped from a helicopter to simulate the conditions of Mach and Reynolds numbers to be encountered by the probes upon entry into the Venus atmosphere. The models were dropped at an average Mach number of .10 and at an average Reynolds number of 2.84 million for the small probe and 2.90 million for the large probe. After the large amplitude launching oscillations were damped, the small probe oscillations in angle of attack and in sideslip were generally less than 2 degrees. The large probe oscillations were generally less than 10 degrees. Both exhibited distinct frequencies. The motion of the small probe in a place perpendicular to the z axis was random while the large probe rotated (corkscrewed) at 1.1 cycles per second about the z axis. The average drag coefficients of the probe models were .714 for the small probe and .663 for the large probe. M.G.

N81-23175*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE USE OF OFF-NADIR POINTING FOR INCREASED TEMPORAL RESOLUTION OF EARTH OBSERVING SATELLITE SYSTEMS
C. C. Schnetzler May 1981 33 p refs
(NASA-TM-82139) Avail: NTIS HC A03/MF A01 CSCL 22A

The change in radiance expected at a satellite in a LANDSAT type orbit by pointing the sensor across track was examined with simulated data. The simulation incorporated the bidirectional reflectance distribution function of a spherical geometry grass canopy and scattering under clear, light haze and heavy haze atmospheric conditions. The results indicate that if the sensor pointed up to + or - 37 deg off nadir (up to three tracks east and west) through a clear atmosphere, between 50% and 75% of the orbital path between 60 deg N and 60 deg S would have two or more off-nadir views within + or - 5% of nadir. Although increased atmospheric scattering causes large variations in across track radiance, it appears possible, using various combinations of views depending on atmospheric conditions, that at least two views could be obtained with radiances within + or - 5% of each other over atmospheric visibilities from 23 km to 4 km. T.M.

N81-23176*# National Aeronautics and Space Administration, Washington, D. C.
INTELSAT V-B (F-1) LAUNCH
21 May 1981 22 p
(NASA-TM-82349; MOR-O-491-203-81-02) Avail: NTIS HC A02/MF A01 CSCL 22A

The second in a series of improved INTELSAT commercial communications satellites will be launched by an Atlas-Centaur from the Eastern Space and Missile Center no earlier than May 21, 1981. The INTELSAT V series has a capacity of 12,000 voice circuits plus two television channels. L.F.M.

N81-23177*# National Aeronautics and Space Administration, Washington, D. C.
SCOUT/NAVY TRANSIT IMPROVEMENT PROGRAM (NOVA-1) LAUNCH
27 Apr. 1981 19 p
(NASA-TM-82350; MOR-O-490-603-81-01) Avail: NTIS HC A02/MF A01 CSCL 22A

The Navy NOVA-1 satellite is scheduled to be launched on a Scout Launch vehicle from the Western Test Range. The NOVA-1 is the first in a new series of improved Transit Navigation Satellites. The satellite will be placed in an elliptical polar transfer orbit of 200.1 by 535.0 NM, period 98.369 minutes, at an inclination of 90.0 degrees. A multiple burn hydrazine motor will then be used to raise and circularize the orbit to approximately 600 NM. L.F.M.

N81-23178# Intergraph Corp., Huntsville, Ala. Systems Evaluation Dept.
HOMING MISSILE GUIDANCE STUDIES: OBSERVABILITY, ADAPTABILITY Final Report
Jason L. Speyer and David G. Hull 31 Mar. 1981 52 p refs
(Contract DAAH01-80-D-0010)
(AD-A097624; Rept-81-016) Avail: NTIS HC A04/MF A01 CSCL 12/1

This study is divided into two parts. First, the observability of the system states is considered when angle information is available. The pseudolinear measurements are used to determine global observability for this nonlinear estimation problem. An observer is constructed by defining a Lyapunov function of the estimation errors. Numerical experiments are used to determine the gains necessary to accurately determine all the states within the time of the engagement. If measurement noise is present, the filter is biased. Techniques of reducing the effect of the bias are explored. The second phase considers the combination of the linear exponential Gaussian (LEG) guidance law with an extended Kalman filter (EKF). The measurement variance of the EKF is estimated on-line. The error variance generated by the EKF is used in the LEG guidance law adaptively, changing its gains. This system is tested in a six-degree-of-freedom simulation of a bank-to-turn missile. Author (GRA)

N81-23102# Government of India, New Delhi.
THE ROLE OF TELECOMMUNICATION SATELLITES IN DEVELOPING COUNTRIES
T. V. Srirangan *In* CNES Symphonie Symp. 1980 p 25-34 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23103# Centre National d'Etudes Spatiales, Toulouse (France).
THE SYMPHONIE PROGRAM: OBJECTIVES, OPERATIONS AND TECHNICAL OPERATIONS OF THE PROJECT [LE PROGRAMME SYMPHONIE: OBJECTIFS, DEROULEMENT ET ORGANISATION DU PROJET TECHNIQUE]
J. Muller *In its* Symphonie Symp. 1980 p 35-41 In FRENCH; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
(Proj. Symphonie)
Avail: NTIS HC A99/MF A01

N81-23104# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
EXPERIMENTAL UTILIZATION OF THE SYMPHONIE

SYSTEM DURING THE FIRST 5 YEARS OF OPERATION [EXPERIMENTELLE NUTZUNG DES SYSTEMS SYMPHONIE WAEHREND DER ERSTEN FUENF BETRIEBSJAHRE]
Manfred Gass *In* CNES Symphonie Symp. 1980 p 43-50 In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
(Proj. Symphonie)
Avail: NTIS HC A99/MF A01

N81-23105# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
THE SYMPHONIE SPACE SEGMENT
Pierre Madon *In* CNES Symphonie Symp. 1980 p 51-62 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23106# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Raumfahrt.
PERFORMANCE OF THE MAIN SUBSYSTEMS OF THE SYMPHONIE SATELLITES [VERHALTEN DER WICHTIGSTEN UNTERSYSTEME DER SYMPHONIE-SATELLITEN]
Kuno Schneider *In* CNES Symphonie Symp. 1980 p 63-71 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23110# Direction Generale des Telecommunications, Pleumeur-Bodou (France). Centre de Telecommunications par Satellite.
VERIFICATION OF PAYLOAD SPECIFICATIONS FOR SYMPHONIE SATELLITES [VERIFICATION DES CARACTERISTIQUES EN ORBITE DE LA CHARGE UTILE DES SATELLITES SYMPHONIE]
R. Issler *In* CNES Symphonie Symp. 1980 p 103-115 ref In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23112# Communication Engineering Inst., Beijing (China).
THE SYMPHONIE EXPERIMENT IN CHINA
Yang Qianli *In* CNES Symphonie Symp. 1980 p 125-143 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23114# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
RESULTS OF THE 60 Mbit/s TDMA SYSTEM. TESTS VIA SYMPHONIE
M. D. Lombard and M. H. Herr (Deutsche Bundespost) *In* CNES Symphonie Symp. 1980 p 163-178 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23125# Deutsche Bundespost, Darmstadt (West Germany). Forschungsinst.
ANALYSIS OF BRIEF DURATION LOSSES AND ERROR STRUCTURES IN SATELLITE LINKS [UNTERSUCHUNG VON KURZZEITAUSFAELLEN UND FEHLERSTRUKTUREN AUF SATELLITENSTRECKEN]
H.-J. Gelbrich *In* CNES Symphonie Symp. 1980 p 317-332 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23148# Centre National d'Etudes Spatiales, Toulouse (France).
METHODS AND TECHNIQUES USED FOR SYMPHONIE ATTITUDE DETERMINATION AND CONTROL
M. Burello, E. Schmidt, J. Foliard, J.-M. Robert, and W. Messner *In its* Symphonie Symp. 1980 p 679-714 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23150# Centre National d'Etudes Spatiales, Toulouse (France).
SUMMARY OF OPERATING EXPERIENCE WITH THE SYMPHONIE SATELLITES
G. Cales, J.-J. Dechezelles (SNIAS, Cannes, France), and B. Ebel (DFVLR, Oberpfaffenhofen, West Germany) *In its* Symphonie Symp. 1980 p 733-742 Partly in ENGLISH and FRENCH (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23163# Messerschmidt-Boelkow G.m.b.H., Munich (West Germany).
APPLICATION OF SYMPHONIE EXPERIENCES IN FOLLOW-UP PROJECTS AT MBB
W. Goeschel and J. Hellweg *In* CNES Symphonie Symp. 1980 p 835-850 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23165# Societe Anonyme d'Etudes et Realisations Nucleaires, Limeil-Brevannes (France).
THE ATTITUDE SENSORS ON SYMPHONIE AND THEIR SUBSEQUENT DEVELOPMENT [LES SENSEURS DE TERRE DU SATELLITE SYMPHONIE ET LEURS DEVELOPPEMENTS ULTERIEURS]
H. Bourcier, F. Desvignes, and F.-X. Doittau *In* CNES Symphonie Symp. 1980 p 867-882 refs In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23166# Societe Nationale Industrielle Aerospatiale, Cannes (France).
THERMAL CONTROL OF SYMPHONIE [LE CONTROLE THERMIQUE DE SYMPHONIE]
Charles Carton *In* CNES Symphonie Symp. 1981 p 883-900 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23168# Indian Space Research Organization, Bangalore.
INDIAN DOMESTIC SATELLITE (INSAT) SYSTEM
P.-P. Kale, M.-L. Rawal (Indian Post and Telegraph Dept., New Delhi), and J. Basu (Indian Post and Telegraph Dept., New Delhi) *In* CNES Symphonie Symp. 1980 p 911-924 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23169# Department of Communications, Ottawa (Ontario).
COMMUNICATION SATELLITES IN CANADA
J. D. Palmer *In* CNES Symphonie Symp. 1980 p 925-940 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23170# Centre National d'Etudes Spatiales, Toulouse (France).
THE FRENCH GERMAN BROADCASTING SATELLITE PROGRAM
A. Pouzet and B. Fabis (DFVLR, Cologne) *In its* Symphonie Symp. 1980 p 941-945 Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23172# Centre National d'Etudes Spatiales, Toulouse (France).
REQUIREMENTS FOR DOMESTIC AND REGIONAL TELECOMMUNICATIONS SATELLITES: PANEL DISCUSSION E
In its Symphonie Symp. 1980 p 963-967 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N81-23179*# National Aeronautics and Space Administration, Washington, D. C. Div. of Public Affairs.
ABOARD THE SPACE SHUTTLE
Florence S. Steinberg 1980 40 p

(NASA-EP-169) Avail: NTIS HC A03/MF A01 CSCL 22B

Livability aborad the space shuttle orbiter makes it possible for men and women scientists and technicians in reasonably good health to join superbly healthy astronauts as space travelers and workers. Features of the flight deck, the mid-deck living quarters, and the subfloor life support and house-keeping equipment are illustrated as well as the provisions for food preparation, eating, sleeping, exercising, and medical care. Operation of the personal hygiene equipment and of the air revitalization system for maintaining sea level atmosphere in space is described. Capabilities of Spacelab, the purpose and use of the remote manipulator arm, and the design of a permanent space operations center assembled on-orbit by shuttle personnel are also depicted. A.R.H.

N81-23180*# National Aeronautics and Space Administration, Washington, D. C.

STS-1 MISSION ASSESSMENT

12 May 1981 22 p

(NASA-TM-82348; MOR-M-989-81-01) Avail: NTIS HC A02/MF A01 CSCL 22A

The Space Transportation System - 1 mission, the first of four manned orbital flights planned for the orbital Flight Test phase of the Space Shuttle Program, was completed on April 14, 1981. This Postflight Report assesses the achievement of the mission objective and provides a detailed description of the flight. L.F.M.

N81-23181*# Systems and Applied Sciences Corp., Hampton, Va.

SUMS PRELIMINARY DESIGN AND DATA ANALYSIS DEVELOPMENT Final Report, Mar. 1979 - Oct. 1980

Edwin W. Hinson May 1981 59 p refs

(Contract NAS1-15772)

(NASA-CR-165696; R-SAL-03/81-02) Avail: NTIS HC A04/MF A01 CSCL 22A

The preliminary analysis and data analysis system development for the shuttle upper atmosphere mass spectrometer (SUMS) experiment are discussed. The SUMS experiment is designed to provide free stream atmospheric density, pressure, temperature, and mean molecular weight for the high altitude, high Mach number region. M.G.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

N81-23182*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

EXISTENCE AND UNIQUENESS OF SOLUTIONS TO A CLASS OF NONLINEAR-OPERATOR-DIFFERENTIAL EQUATIONS ARISING IN AUTOMATED SPACESHIP NAVIGATION

Victor M. Bogdan (Catholic Univ.) Washington May 1981 23 p refs

(NASA-TP-1860; S-506; JSC-16755) Avail: NTIS HC A02/MF A01 CSCL 17G

A proof is given of the existence and uniqueness of the solution to the automatic control problem with a nonlinear state equation of the form $y' = f(t,y,u)$ and nonlinear operator controls $u = U(y)$ acting onto the state function y which satisfies the initial condition $y(t) = x(t)$ for $t < \text{or} = 0$. M.G.

N81-23149# Centre National d'Etudes Spatiales, Toulouse (France).

SYMPHONIE: IN-FLIGHT PERFORMANCE OF TELEMETRY-TELECOMMAND, POWER SUPPLY, THERMAL CONTROL AND TRANSPONDER SUBSYSTEMS

P. Debay, J.-J. Dechezelles (SNIAS, Cannes, France), and G. Seeck (DFVLR, Oberpfaffenhofen, West Germany) *In its* Symphonie Symp. 1980 p 715-731 (For primary document see N81-23101 14-12)

Avail: NTIS HC A99/MF A01

N81-24005*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.

HIGH SPEED FRONT END OF THE MULTIMEGABIT TELEMETRY DEMODULATOR DETECTOR

E. R. Wechsler *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 43-49 refs (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 09F

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N81-23183# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.

ACOSS SIX (ACTIVE CONTROL OF SPACE STRUCTURES) Interim Report, 14 Feb. - 15 Jul. 1980

Robert R. Strunce, Jiguan G. Lin, Daniel R. Hegg, Ronald K. Pearson, and Jacques P. Govignon Jan. 1981 162 p refs

(Contract F30602-80-C-0096; ARPA Order 3654; AF Proj. 3654)

(AD-A097206; R-1404; RADC-TR-80-377) Avail: NTIS HC A08/MF A01 CSCL 22/2

The theoretical research documented in this report addresses control law design methodologies relevant to control of large space structures. Emphasis is on model reduction, design methods for determining reduced-order compensators, and criteria for determining overall closed-loop system stability. A simple but realistic evaluation model (Draper Model no. 2) is presented which will be used to assess performance and sensitivity of the various active structural control methods. GRA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N81-23184*# Aerojet Liquid Rocket Co., Sacramento, Calif.

ADVANCED OXYGEN-HYDROCARBON ROCKET ENGINE STUDY Bimonthly Progress Report, 1 Feb. - 31 Mar. 1980

J. O. OBrien, R. L. Ewen, S. Kent, and G. M. Meagher 10 Apr. 1980 53 p

(Contract NAS8-33452)

(NASA-CR-161760; Rept-33452-M-3) Avail: NTIS HC A04/MF A01 CSCL 21H

The program consists of parametric analysis and design to provide a consistent engine system data base for definiing advantages and disadvantages, system performance and operating limits, engine parametric data, and technology requirements for candidate high pressure LO2/Hydrocarbon engine systems. The parametric chamber and nozzle cooling analysis was completed for the four potential coolants: RP-1, LCH4, LO2, and LH2. A summary of the cooling capability of each propellant is presented. T.M.

N81-23185*# Aerojet Liquid Rocket Co., Sacramento, Calif.
ADVANCED OXYGEN-HYDROCARBON ROCKET ENGINE STUDY Bimonthly Technical Progress Report, 1 Apr. - 30 May 1980
C. J. OBrien and R. Salkeld 10 Jun. 1980 63 p
(Contract NAS8-33452)
(NASA-CR-161759; Rept-33452-M-4; BMPR-4) Avail: NTIS HC A04/MF A01 CSCL 21H

The advantages and disadvantages, system performance and operating limits, engine parametric data, and technology requirements for candidate high pressure LO2/Hydrocarbon engine systems are summarized. These summaries of parametric analysis and design provide a consistent engine system data base. Power balance data were generated for the eleven engine cycles. Engine cycle rating parameters were established and the desired condition and the effect of the parameter on the engine and/or vehicle are described. T.M.

N81-23186*# Aerojet Liquid Rocket Co., Sacramento, Calif.
ADVANCED OXYGEN-HYDROCARBON ROCKET ENGINE STUDY Final Report
C. J. OBrien and R. L. Ewen Apr. 1981 330 p refs
(Contract NAS8-33452)
(NASA-CR-161748; Rept-33452F) Avail: NTIS HC A15/MF A01 CSCL 21H

This study identifies and evaluates promising LO2/HC rocket engine cycles, produces a consistent and reliable data base for vehicle optimization and design studies, demonstrates the significance of propulsion system improvements, and selects the critical technology areas necessary to realize an improved surface to orbit transportation system. Parametric LO2/HC engine data were generated over a range of thrust levels from 890 to 6672 kN (200K to 1.5M lbF) and chamber pressures from 6890 to 34500 kN (1000 to 5000 psia). Engine coolants included RP-1, refined RP-1, LCH4, LC3H8, LO2, and LH2. LO2/RP-1 G.G. cycles were found to be not acceptable for advanced engines. The highest performing LO2/RP-1 staged combustion engine cycle utilizes LO2 as the coolant and incorporates an oxidizer rich preburner. The highest performing cycle for LO2/LCH4 and LO2/LC3H8 utilizes fuel cooling and incorporates both fuel and oxidizer rich preburners. LO2/HC engine cycles permitting the use of a third fluid LH2 coolant and an LH2 rich gas generator provide higher performance at significantly lower pump discharge pressures. The LO2/HC dual throat engine, because of its high altitude performance, delivers the highest payload for the vehicle configuration that was investigated.
Author

N81-23187*# Lockheed Missiles and Space Co., Huntsville, Ala.
AN ANALYTICAL PROCEDURE AND AUTOMATED COMPUTER CODE USED TO DESIGN MODEL NOZZLES WHICH MEET MSFC BASE PRESSURE SIMILARITY PARAMETER CRITERIA Final Report
Peter R. Sulyma May 1980 112 p refs
(Contract NAS8-33801)
(NASA-CR-161757; LMSC-HREC-TR-D784111) Avail: NTIS HC A06/MF A01 CSCL 21H

Fundamental equations and similarity definition and application are described as well as the computational steps of a computer program developed to design model nozzles for wind tunnel tests conducted to define power-on aerodynamic characteristics of the space shuttle over a range of ascent trajectory conditions. The computer code capabilities, a user's guide for the model nozzle design program, and the output format are examined. A program listing is included. A.R.H.

N81-23188*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRACTION DRIVE FOR CRYOGENIC BOOST PUMP
Scott Meyer and R. E. Connelly Mar. 1981 23 p refs
(NASA-TM-81704; E-730) Avail: NTIS HC A02/MF A01 CSCL 21H

Two versions of a Nasvytis multiroller traction drive were tested in liquid oxygen for possible application as cryogenic boost pump speed reduction drives for advanced hydrogen-oxygen rocket engines. The roller drive, with a 10.8:1 reduction ratio, was successfully run at up to 70,000 rpm input speed and up to 14.9 kW (20 hp) input power level. Three drive assemblies were tested for a total of about three hours of which approximately one hour was at nominal full speed and full power conditions. Peak efficiency of 60 percent was determined. There was no evidence of slippage between rollers for any of the conditions tested. The ball drive, a version using balls instead of one row of rollers, and having a 3.25:1 reduction ratio, failed to perform satisfactorily. M.G.

N81-23189# Los Alamos Scientific Lab., N. Mex.
SPACE NUCLEAR SAFETY AND FUEL PROGRAM Progress Report
S. E. Bronisz, comp. Feb. 1981 23 p
(Contract W-7405-eng-36)
(LA-8749-PR) Avail: NTIS HC A02/MF A01

The use of Pu(-238)O2 in radioisotopic power systems was studied. A series of impact tests was executed. Reasons for completing the tests are: (1) the iridium failure in the 90 deg test; (2) prior tests were performed with fuel pellets with different microstructures; and (3) thermal calculations show that the design of the module needs to be changed to increase impact temperature. E.A.K.

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N81-23190# Union Carbide Corp., Oak Ridge, Tenn. Y-12 Development Div.
MATERIALS FOR HIGH-TEMPERATURE HYDROGEN FLUORINE ENVIRONMENTS Final Report
C. E. Holcombe, Jr. and L. Kovach 4 Mar. 1981 166 p refs
(Contract W-7405-eng-26)
(AD-A097426; Y-2201) Avail: NTIS HC A08/MF A01 CSCL 11/2

A determination has been made of the stability of 35 materials under high-temperature, fluorine rich, hydrogen fluoride torch testing. Refractory materials tested included 4 borides, 3 carbides, 3 nitrides, 12 oxides, 1 oxynitride, 1 sulfide, 10 metals, and carbon (10 types). Three materials distinctly performed better than nickel: lanthanum hexaboride, calcium hexaboride, and the lanthanum silicon oxynitride. Of these, lanthanum hexaboride is the best candidate tested since it has an estimated upper use temperature = 1726 K, which is above the melting point and more than 300 K above the upper use temperature of nickel.
GRA

N81-23191# Oak Ridge Y-12 Plant, Tenn. Materials and Ceramics Div.
MATERIALS FOR HIGH-TEMPERATURE HYDROGEN FLUORINE ENVIRONMENTS Final Report, Jun. 1976 - Dec. 1978
C. E. Holcombe, Jr. and L. Kovach Mar. 1981 173 p refs Sponsored in Part by AF
(Contract W-7405-eng-26)
(Y-2201) Avail: NTIS HC A08/MF A01

The stability of 35 materials under high-temperature, fluorine rich, hydrogen fluoride torch testing was determined. Refractory materials tested included 4 borides, 3 carbides, 3 nitrides, 12 oxides, 1 oxynitride, 1 sulfide, 10 metals, and carbon (10 types). Three materials distinctly performed better than nickel: lanthanum hexaboride, calcium hexaboride, and lanthanum silicon oxynitride. Of these, lanthanum hexaboride is the best

candidate tested since it has an estimated upper use temperature > 1726 K, which is above the melting point and more than 300 K above the upper use temperature of nickel. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N81-23192*# Northrop Corp., Hawthorne, Calif. Aircraft Div.
FATIGUE DEGRADATION IN COMPRESSIVELY LOADED COMPOSITE LAMINATES Final Report
R. L. Ramkumar Apr. 1981 154 p refs
(Contract NAS1-15956)
(NASA-CR-165681; NOR-81-79) Avail: NTIS HC A08/MF A01 CSCL 11D

The effect of imbedded delaminations on the compression fatigue behavior of quasi-isotropic, T300/5208, graphite/epoxy laminates was investigated. Teflon imbedments were introduced during panel layup to create delaminations. Static and constant amplitude (R = 10, omega = 10 Hz) fatigue tests were conducted. S-N data and half life residual strength data were obtained. During static compression loading, the maximum deflection of the buckled delaminated region was recorded. Under compression fatigue, growth of the imbedded delamination was identified as the predominant failure mode in most of the test cases. Specimens that exhibited others failures had a single low stiffness ply above the Teflon imbedment. Delamination growth during fatigue was monitoried using DIB enhanced radiography. In specimens with buried delaminations, the dye penetrant (DIB) was introduced into the delaminated region through a minute laser drilled hole, using a hypodermic needle. A low kV, microfocus, X-ray unit was mounted near the test equipment to efficiently record the cyclic growth of buried delaminations on Polaroid film. A.R.H.

N81-23193*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
CREEP AND CREEP RUPTURE OF LAMINATED GRAPHITE/EPOXY COMPOSITES Ph.D. Thesis. Final Report, 1 Oct. 1979 - 30 Sep. 1980
D. A. Dillard (Missouri Univ., Rolla), D. H. Morris, and H. F. Brinson Mar. 1981 47 p refs
(Contract NCC2-71; Grant NsG-2038)
(NASA-CR-164297; VPI-E-81-3) Avail: NTIS HC A03/MF A01 CSCL 11D

An incremental numerical procedure based on lamination theory is developed to predict creep and creep rupture of general laminates. Existing unidirectional creep compliance and delayed failure data is used to develop analytical models for lamina response. The compliance model is based on a procedure proposed by Findley which incorporates the power law for creep into a nonlinear constitutive relationship. The matrix octahedral shear stress is assumed to control the stress interaction effect. A modified superposition principle is used to account for the varying stress level effect on the creep strain. The lamina failure model is based on a modification of the Tsai-Hill theory which includes the time dependent creep rupture strength. A linear cumulative damage law is used to monitor the remaining lifetime in each ply. E.D.K.

N81-23194# Washington State Univ., Pullman. Dept. of Physics.
THE EMISSION OF ELECTRONS AND POSITIVE IONS FROM FRACTURE OF MATERIALS
J. T. Dickinson, E. E. Donaldson, and M. K. Park 1 Apr. 1981 39 p refs Submitted for publication
(Contract N00014-80-C-0213; NR Proj. 092-558)
(AD-A097390; TR-1) Avail: NTIS HC A03/MF A01 CSCL 11/4

The emission of electrons and positive ions from materials undergoing fracture is investigated. We present a survey of charged particle emission from a number of materials including crystalline insulators, glass, graphite, polymers, and composites. Particular attention is given to fiber-reinforced epoxy systems which yield unique forms of charge emission. Energy distributions of the emitted particles are given for E-glass/epoxy strands, polybutadiene filled with glass beads, and mica. Evidence is presented that interfacial failure and charge separation play important roles in the observed emission. Author (GRA)

N81-23195# Texas A&M Univ., College Station. Mechanics and Materials Research Center.
COMPOSITE MATERIALS FOR STRUCTURAL DESIGN Annual Technical Report, 1 Jan. - 31 Dec. 1980
R. A. Schapery, W. L. Bradley, W. E. Haisler, J. S. Ham, K. L. Jerina, and Y. Weitsman Feb. 1981 127 p refs
(Contract F49620-78-C-0034; AF Proj. 2307)
(AD-A097297; MM-3724-81-5; AFOSR-81-0326TR; ATR-3)
Avail: NTIS HC A07/MF A01 CSCL 11/4

Summarized are research activities related to polymer-matrix composite materials in the areas of processing and dynamic mechanical testing, physical aging, delamination fracture characterization, temperature and moisture effects, finite element modelling, and fracture and damage analysis of nonlinear visco-elastic materials. Also included are abstracts of seven M.S. theses and six papers describing several recently completed experimental and analytical research investigations of factors which pertain to processing, testing, and analysis of composite structures. Author (GRA)

N81-23196# Illinois Inst. of Tech., Chicago.
DIFFUSION MECHANISMS AND DEGRADATION OF ENVIRONMENTALLY SENSITIVE COMPOSITE MATERIALS Progress Report, 1 Jul. 1980 - 30 Jun. 1981
L. J. Broutman 1 Mar. 1981 32 p refs
(Contracts DE-AS02-77ER-04440; EG-77-S-02-4440)
(COO-444-9) Avail: NTIS HC A03/MF A01

Moisture diffusion was studied in both epoxy resins and glass and graphite fiber composites. A fixture was perfected for maintaining a constant stress on a specimen during the diffusion experiment. Experiments on epoxy resins were conducted at four different temperatures at zero stress and at 2400 psi stress. For temperatures less than 900 C, non-Fickian diffusion occurs. Several existing models to explain the diffusion behavior were utilized to no avail. It was discovered that diffusion curves for various thickness samples will superimpose at high sorption levels if plotted vs square root of time/square root of thickness. A model to account for this phenomena is being considered. In general the effect of stress is to increase both the moisture uptake rate and the equilibrium weight gain, and as a result the calculated diffusivity is nearly unaltered. At 900 C, epoxy resin samples have exhibited creep strains of nearly 20% when subjected to 2400 psi stress, whereas the creep strain in air is only 7% at 1000 C. DOE

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N81-23197 Houston Univ., Tex.
FACTORS INFLUENCING THE REDOX REACTIONS OF IRON PORPHYRINS Ph.D. Thesis
Lawrence Andrew Bottomley 1980 238 p
Avail: Univ. Microfilms Order No. 8106901

The interacting effects of porphyrin ring basicity and axial coordination on the standard redox potential for the metal centered reactions of a number of synthetic iron porphyrins are described. Elucidation of these factor effects was considered as the first step toward the characterization, prediction, and control of metalloporphyrin reactivity. The redox potential of the Fe(3)/Fe(2) couple was tuned over a 1300 mV potential range by appropriate selection of the Fe(3) counterion and/or nitrogenous base coordinated to either the Fe(3) or Fe(2) center. The redox potential as well as the stoichiometry of both the electrode reactant and product were modified by changing the solvent in which the redox reaction was carried out. Variations in these factors also produced systematic changes in the number of electrons

transferred and changes in the electron mechanisms.
Dissert. Abstr.

N81-23198 Northeastern Univ., Boston, Mass.
THE ROLE OF MICROCOMPUTERS IN TRACE METAL ANALYSIS Ph.D. Thesis
Leon Joseph Davidowski 1980 269 p
Avail: Univ. Microfilms Order No. 8106992

The application of a kit-form microcomputer to various forms of rapid scan and anodic stripping voltammetries is detailed. The effects of operating parameters were investigated and found to abide by theoretical predictions. The ASV was successfully used to quantify Pb in NBS reference materials. The microcomputer based voltammetric analyzer is shown to be flexible and an inexpensive alternative to analog and minicomputer controlled instrumentation. A description of how a microcomputer can aid in the characterization of matrix interferences in electrothermal atomization AAS is included. Dissert. Abstr.

N81-23199 Arizona Univ., Tucson.
KINETIC STUDIES OF HETEROGENEOUS BIOCATALYSIS USING THE ROTATING RING-DISK ENZYME ELECTRODE Ph.D. Thesis
Ralph Andrew Kamin 1980 119 p
Avail: Univ. Microfilms Order No. 8108321

Glucose oxidase was immobilized by covalent attachment to a variety of disk electrode supports resulting in the rotating ring disk enzyme electrode (RRDEE). Covalent attachment to graphitic oxide, platinum and carbon paste was achieved using the bifunctional reagents glutaraldehyde or 1-ethyl-3(3-dimethyl amino-propyl) carbodiimide. By varying the electrode rotation speed, the effects of external substrate mass transport on the rate of enzymatic catalysis were investigated. The rate enzymatic catalysis is evaluated by spectrophotometrically monitoring the formation of the product H_2O_2 in the bulk solution.
Dissert. Abstr.

N81-23200 Cincinnati Univ., Ohio.
COMPUTER UTILIZATION IN ANALYTICAL INSTRUMENTATION Ph.D. Thesis
Michael Edward Jackson 1981 99 p
Avail: Univ. Microfilms Order No. 8107490

A sucessful method of utilizing various laboratory computers in conjunction with analytical instrumentation was implemented. The problems with such a venture are investiged and solutions are discussed. Portions of the study leading to the general applicability of the methods are described in detail. Both software and hardware aspects are presented to show feasibility for any laboratory. Communication techniques between laboratory computers and with main frame computers is shown to be not only a useful support utility but also a trivial project to implement. The software to implement full floating point mathematics is described as well as that necessary for the scientist to formulate a convenient, workable, and powerful command language. A novel analog signal to discrete level converter interface is shown in detail. An exciting method to utilize stepper motor driven devices is presented. Several other interfaces are presented that are only available to this laboratory but are applicable to others.
Dissert. Abstr.

N81-23201 California Univ., Irvine.
ANALYTICAL APPLICATIONS OF ION CYCLOTRON RESONANCE MASS SPECTROSCOPY Ph.D. Thesis
Edward Bertram Ledford, Jr. 1980 324 p
Avail: Univ. Microfilms Order No. 8106780

A capacitance bridge detection system has dramtically improved the performance of the ion cyclotron resonance mass spectrometer. High mass range and high mass resolution are now possible. Fixed magnetic field, frequency sweep mass scanning has resulted in rapid acquisition of high resolution mass spectra. The construction of the capacitance bridge detection system and the detailed theory of its operation are presented. Preliminary experiments designed to test the analytical capabilities of the instrumentation are described. Dissert. Abstr.

N81-23202 Montana State Univ., Missoula.
ALTERATION OF THE RESPONSE OF THE ELECTRON CAPTURE DETECTOR BY ADDITION OF OXYGEN TO THE CARRIER GAS Ph.D. Thesis
Dennis Alan Miller 1980 185 p
Avail: Univ. Microfilms Order No. 8108341

The addition of oxygen to the nitrogen carrier gas of a constant current electron capture detector (ECD) is shown to provide greatly increased sensitivity to compounds having few and particularly only one chlorine atom. As an example of this use, an improved analysis procedure for methyl chloride in ambient air is demonstrated. The enhancement of the ECD response of 32 simple chlorinated molecules caused by the addition of oxygen to its carrier gas was determined. The effects of size and isomeric differences for alkyl, vinyl, allyl, and phenyl chlorides and several chlorofluoromethanes are reported. Oxygen doping is shown to be useful for compound identification, since the magnitude of the response enhancement varies greatly with compound type and is reproducible for a given compound. A mechanism previously proposed is further developed here into a detailed model of instrument response. It appears that gas phase relative rates of the reactions of O_2 with chlorinated hydrocarbons can be derived from ECD data obtained in the manner described here. Dissert. Abstr.

N81-23203 Ohio State Univ., Columbus.
THE DEVELOPMENT OF TWO NOVEL SPECTRO-ELECTROCHEMICAL TECHNIQUES Ph.D. Thesis
Richard Theodore Pruiksma 1980 287 p
Avail: Univ. Microfilms Order No. 8107383

The use of glancing incidence angle for reflection spectro-electrochemistry results in an enhancement of the optical absorbance by greater than a factor of 100. The absorbance vs. time profiles at various angles are presented. In the second technique, using a beam of light parallel to the plane of the electrode, the diffusion profile of an electrogenerated species can be investigated. A slit placed in the light beam after the electrode was used to sample various distances from the electrode. Concentration vs. time and concentration vs. distance profiles are plotted and compared with theoretical curves based on Fick's law of diffusion. Dissert. Abstr.

N81-23204 Ohio State Univ., Columbus.
BIOELECTROCATALYSIS USING CHEMICALLY MODIFIED ELECTRODES Ph.D. Thesis
Chi-Sing Daniel Tse 1980 192 p
Avail: Univ. Microfilms Order No. 8107406

A systematic approach to develop a chemically modified electrode (CME) for the electrocatalytic oxidation of dihydronicotinamide adenine dinucleotide (NADH) was shown. The study showed the mediator, 3,4-dihydroxbenzylamine (3,4-DHBA) to be the best for NADH oxidation. The enzymatic activity of the generated NAD(+) ranged from 93% to 98%. The 3,4-DHBA molecules were attached to glassy carbon electrodes via the amidization reaction. The covalent binding of 3,4-DHBA was confirmed by electrochemical characterization of the CME and attachments of control compounds, 4-methylcatechol and dopamine.
Dissert. Abstr.

N81-23205*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INEXPENSIVE CROSS-LINKED POLYMERIC SEPARATORS MADE FROM WATER SOLUBLE POLYMERS
Li-Chen Hsu and Dean W. Sheibley 1979 16 p refs Presented at Ann. Meeting of the Electrochem. Soc., Inc., Los Angeles, 14-19 Oct. 1979
(NASA-TM-82619; E-767) Avail: NTIS HC A02/MF A01 CSCL 07D

Polyvinyl alcohol (PVA) crosslinked chemically with aldehyde reagents produces membranes which demonstrate oxidation resistance, dimensional stability, low ionic resistivity, low zincate diffusivity, and low zinc dendrite penetration rate which make them suitable for use as alkaline battery separators. They are intrinsically low in cost and environmental health and safety problems associated with commercial production appear minimal. Preparation, property measurements, and cell test results in Ni/Zn and Ag/Zn cells are described and discussed. Author

N81-23206# Defence Research Establishment, Ottawa. (Ontario). Energy Conversion Div.
SOME TOPICS IN APPLIED ELECTROCHEMICAL KINETICS

E. J. Casey, J. R. Coleman, and W. A. Adams Jul. 1980 29 p refs
(AD-A097405; DREO-R-829) Avail: NTIS HC A03/MF A01 CSCL 07/4

The designer of an electrochemical reactor attempts to minimize the inevitable energy losses associated with irreversible processes. The slow steps, which are the greatest offenders, have to be identified. Fortunately, diagnostic techniques have arisen from developments in electrochemical kinetics, not only for electrode processes but also for the mass-transfer and phase-separation processes which occur in series and parallel in every electrochemical reactor. Although electroplating, anodizing and electromachining, electrowinning and electrosynthesis are acknowledged as activities also of great importance to Canadian life, in this paper the examples will be drawn from the authors: work on batteries and fuel cells, i.e., from attempts to identify the slow steps and the wasteful side reactions, and to design around them. The mutual influence of theoretical ideas and practical achievements is the unifying theme of this lecture.
Author (GRA)

N81-23207# Arizona Univ., Tucson. Optical Sciences Center.
COHERENT TRANSIENT EFFECT STUDIES OF RYDBERG ATOMS Interim Report, 1 Mar. 1980 - 1 Mar. 1981
Richard L. Shoemaker and William H. Wing 25 Mar. 1981 7 p
(Contract N00014-79-C-0488; NR Proj. 393-041; RR011301)
(AD-A097588) Avail: NTIS HC A02/MF A01 CSCL 07/4

New techniques for making time-resolved studies of atoms in highly excited (Rydberg) states are being developed. In particular, the absorption or emission of radiation by Rydberg-state atoms is monitored on a nanosecond time scale during and after irradiation by various CO2 laser pulse sequences. The signals thus produced (known as coherent transient effects), will be studied in order to provide both information about collisional relaxation processes in Rydberg atoms and other spectroscopic data.
Author (GRA)

N81-23208# Exxon Research and Engineering Co., Linden, N.J. Corporate Research Technology Feasibility Center.
RADIATION/CATALYTIC AUGMENTED COMBUSTION Interim Report, 1 Jun. 1979 - 31 May 1980
Moshe Lavid Sep. 1980 26 p refs
(Contract F49620-77-C-0085; AF Proj. 2308)
(AD-A097442; AFOSR-81-0287TR) Avail: NTIS HC A03/MF A01 CSCL 21/2

This research encompasses two promising techniques for extending aircraft operational range. They are radiative and catalytic augmentation techniques to enhance combustion initiation and reaction kinetics which restrict combustor operation via limits on flammability, flame propagation, ignition and stability. Both techniques have demonstrated the capability to enhance combustion processes and to broaden normally encountered stability limits. The radiative technique under laboratory static conditions has successfully ignited fuel-air mixtures, and has enhanced combustion processes, utilizing pulsed and continuous VUV light sources. Similarly, the catalytic technique has provided efficient combustion under normally difficult fuel lean, low temperature, conditions. A complementary effort involves the development of analytical capability required for modeling the radiative and catalytic techniques.
Author (GRA)

N81-23209# Wisconsin Univ. - Madison. Materials Science Center.
CORRECTION FOR LOSS EFFECTS IN VALENCE-BAND XPS SPECTRA BY DECONVOLUTION
G. D. Davis and M. G. Lagally 15 Jan. 1981 21 p refs
Submitted for publication
(Contract N00014-77-C-0474; NR Proj. 322-072)
(AD-A097598; TR-5) Avail: NTIS HC A02/MF A01 CSCL 07/4

We present XPS valence band spectra for GaAs(110) and GeSe(001) that have been corrected for coherent loss effects by deconvolution of an instrument/loss function that includes a source function for an unmonochromatized source, a backscatter-electron spectrum to account for energy losses, and an analyzer function. The results are compared with background-subtracted spectra. The deconvolution yields spectra that have significantly greater intensity deep in the band, bringing measurements into closer agreement with theory than is achieved with background subtraction.
Author (GRA)

N81-23210# SRI International Corp., Menlo Park, Calif. Physical Sciences Div.
THERMOCHEMISTRY OF GASEOUS COMPOUNDS OF METALS Final Report, 5 Dec. 1977 - 4 Dec. 1980
D. L. Hildenbrand, K. H. Lau, R. D. Brittain, P. D. Kleinschmidt, and R. H. Lamoreaux Mar. 1981 69 p refs
(Contract F49620-78-C-0033; AF Proj. 2308; SRI Proj. 7028)
(AD-A097352; AFOSR-81-0330TR) Avail: NTIS HC A04/MF A01 CSCL 07/4

The results obtained during a three-year program of thermochemical studies of gaseous inorganic metal compounds are summarized in this report. The metal compounds studied were primarily the fluorides, oxides, and oxyfluorides of the transition and lanthanide metals, potential hot corrosion products and/or reaction products of chemical pumping steps in potential lasing processes. Specific chemical systems studied were the gaseous fluorides of Mo, Ta, Zr, B, Sc, Y, La, Ni, Sm, Eu, and Tm; the oxides of Lu and Tm; and the oxyfluorides of Ta and W. Derived thermochemical data include the standard enthalpies of formation, bond dissociation energies, ionization energies, and in most cases absolute entropy data that can be used to check the assignment of spectroscopic and molecular constants; the latter proved to be particularly important for the scandium group lanthanide group metal compounds, which have large but uncertain electronic contributions to the entropy and Gibbs energy function. The entropy and enthalpy data can be used together to evaluate the equilibrium behavior of these systems over wide temperature ranges. Bond dissociation energy data for the scandium-group and lanthanide fluorides, which have sufficient ionic bonding for valid comparisons, correlate well with the predictions of the polarizable ion model, providing further corroboration for the usefulness of this model in generating thermomechanical data for species not studied experimentally. The thermochemical data for the tantalum fluorides provide a clear explanation for the observed resistance of tantalum to attack by fluorine at high temperatures and low pressures.
Author (GRA)

N81-23211# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronics Technology/Devices Lab.
ELECTROCHEMICAL BEHAVIOR OF COPPER IN THIONYL CHLORIDE SOLUTIONS
Wishvender K. Behl Dec. 1980 14 p refs
(DA Proj. 1L1-61102-AH-47)
(AD-A097425; DELET-TR-80-20) Avail: NTIS HC A02/MF A01 CSCL 07/4

The electrochemical and chemical behavior of copper and copper chlorides was studied in 1.5 molar LiAlCl4-SOCl2 solutions using cyclic voltammetric, controlled potential electrolysis and X-ray techniques. It was shown that copper metal reacts with thionyl chloride even at ambient temperatures resulting in the formation of cuprous chloride and cupric sulfide. In LiAlCl4-SOCl2 solutions, cuprous chloride is further oxidized, chemically as well as electrochemically, to cupric chloride. Cupric chloride was found to be electroactive in these solutions and undergoes reduction in the solid state to cuprous chloride and copper, respectively. It was also found that due to the presence of copper chloride films at the copper metal electrode in these solutions, the electrochemical reduction of thionyl chloride at copper electrodes occurs at more negative potentials than observed at carbon electrodes.
Author (GRA)

N81-23212# California Univ., Los Angeles.
ON THE ORIGINS OF HOMOGENEOUS AND INHOMOGENEOUS LINEWIDTHS OF THE (D-5)0-(F-7)0 TRANSITION OF Eu-3(+) IN AMORPHOUS SOLIDS
J. R. Morgan, E. P. Chock, W. D. Hopewell, M. A. Elsayed, and R. Orbach 23 Mar. 1981 24 p refs
(Contract N00014-75-C-0602; NR Proj. 056-498)
(AD-A097614; TR-37) Avail: NTIS HC A02/MF A01 CSCL 07/4

Fluorescence line narrowing techniques have been used to

measure the homogeneous widths of the 5D sub 0 - 7F sub 0 transition of Eu(3-) in a variety of glasses at room temperature. The homogeneous width is found to vary linearly with the modifier concentration for the borate glasses and also linearly with the transition frequency within the inhomogeneous profile in all of the glasses studied. These results, together with the observed changes in the inhomogeneous width in the borate glass with modifier concentration, are discussed in terms of dynamical processes associated with phonon modulation of the so-called two level systems in glasses, and the static chemical structure of the glass. Author (GRA)

N81-23213# Mount Holyoke Coll., South Hadley, Mass.
STUDIES OF THE PHOTOELECTROCHEMISTRY OF ORGANIC DYES USING ATTENUATED TOTAL REFLECTION TECHNIQUES Annual Progress Report, 1 Jun. 1980 - 31 May 1981
M. T. Spitler Jan. 1981 9 p
(Contract DE-AC02-80ER-10632)
(DOE/ER-10632/1) Avail: NTIS HC A02/MF A01

An experimental apparatus was assembled for the photoelectrochemical investigation of organic dyestuffs; through the use of attenuated total reflection (ATR) techniques, it is capable of measuring photocurrent, dye absorbance, and fluorescence simultaneously in computer controlled experiments with a time resolution of 200 nsec. Selected semiconductors were cut and polished to the prismatic shape required of the substrate electrode. The spectral and energetic characteristics of several series of cyanine dyes were determined; their photoelectrochemical behavior was studied using standard techniques prior to use in the ATR system. Experimentation with these dyes in the ATR arrangement is in progress. DOE

N81-23214# EIC, Inc., Newton, Mass.
DEVELOPMENT OF PHOTOELECTROCHEMICAL CELLS BASED ON COMPOUND SEMICONDUCTORS AND NONAQUEOUS ELECTROLYTES Quarterly Technical Progress Report, 1 Aug. - 31 Oct. 1980
R. D. Rauh Dec. 1980 27 p refs Sponsored in part by Midwest Research Inst.
(Contract DE-AC02-77CH-00178)
(SERI/PR-8002-7-T1) Avail: NTIS HC A03/MF A01

A solar cell using polyvinylpyrrolidone treated polycrystalline n-GaAs and CH3CN, 13(-)/1(-) electrolyte achieved a power conversion efficiency of 4.3% with i (sub sc) = 11.6 mA/sq cm, V (sub oc) = -0.485V, P (sub max) = 2.3 mV/sq cm, ff = 0.40 at 53.3 mW sq cm Xe arc intensity. A p-GaAs electrode in the same acetonitrile electrolyte gives photovoltages similar to those reported for aqueous HI/12 electrolyte, but the photocurrent decays rapidly with time. Exploratory work on pZn3P2 indicates that nonaqueous electrolytes will probably be required for EPCs based on this semiconductor due to a dark reaction of Zn3P2 with H20 to liberate PH3. Stable photoresponse was obtained in CH3CN, 13(-)/1(-). DOE

N81-23215# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
CATALYTIC COMBUSTION OF COAL-DERIVED LIQUID FUELS Final Report
E. K. Chu, G. C. Snow, and H. Tong Jan. 1981 140 p refs
(EPRI Proj. 989-3)
(EPRI-AP-1666) Avail: NTIS HC A07/MF A01

The feasibility of catalytically burning currently available coal derived liquids was evaluated. The combustion characteristics of coal derived liquids in catalytic reactors were determined and possible long term poisoning of the catalyst by the coal derived liquid was evaluated. Tests were conducted with three state of the art catalytic materials and three fuels: No. 2 diesel for baseline data, and H Coal and SRC II coal derived liquids. The results show that coal derived liquids can be burned catalytically, but the catalysts were prone to poisoning or deactivation. However, the causes for catalyst deactivation were not clearly identified. DOE

N81-23216# TRW Defense and Space Systems Group, Redondo Beach, Calif. Energy Technology Dept.
COAL COMBUSTION AEROTHERMOCHEMISTRY RESEARCH Final Report
A. B. Witte, N. Gat, M. R. Dension, and L. M. Cohen 15 Dec. 1980 260 p refs
(Contract DE-AC01-79ER-10029)
(DOE/ER-10029/T1) Avail: NTIS HC A12/MF A01

On the basis of extensive aerothermochemistry analyses, laboratory investigations, and combustor tests, significant headway was made toward improving the understanding of combustion phenomena and scaling of high swirl pulverized coal combustors. A special attempt was made to address the gap between scientific data available on combustion and hardware design and scaling needs. Both experimental and theoretical investigations were conducted to improve the predictive capability of combustor scaling laws. The scaling laws derived apply to volume and wall burning of pulverized coal in a slagging high swirl combustor. DOE

N81-23217# Bureau of Mines, Albany, Oreg.
EFFECTS OF ADDITIVES ON METHANATION ACTIVITY OF RANEY NICKEL CATALYSTS
J. H. Russell, Laurance L. Oden, and Jack L. Henry 1980 25 p refs Sponsored in part by DOE
(BM-RI-8487) Avail: NTIS HC A02/MF A01

The Bureau of Mines has attempted to increase the activity of nickel catalysts for converting synthesis gas, derived from coal, to a substitute natural gas. The effects of low level additions of B, Ca, Ce, Co, Mn, Mo, Pd, Re, Ti, Y, Zn, and Zr on the methanation activity of Raney nickel are described. The methanation rate are 3200 C and the resistance to poisoning by 2 ppM H2S were used to compare catalysts. The effects of the additions were small, and the experimental variances were large, necessitating the use of statistical methods to identify significant effects. The Co, Ti, Y, and Zn improved the resistance to H2S poisoning, but only Co improved the methanation rate. In some individual catalysts containing Ca, Mo, or Mn, both the methanation rate and resistance to H2S poisoning were improved. DOE

N81-23218# Spectron Development Labs., Inc., Costa Mesa, Calif.
PARTICULATE PROCESSES IN PULVERIZED COAL FLAMES Quarterly Technical Progress Report, Oct. - Dec. 1980
Jan. 1981 40 p refs
(Contract DE-AC22-80PC-30300)
(DOE/PC-30300/T2; SDL-81-2177-05Q) Avail: NTIS HC A03/MF A01

Major attention was focused on the design and construction of the experiment. The design of two dilute coal stream reactor heads was completed as was the fabrication of one of the reactor heads. A parametric analysis of furnace design was conducted to allow operating conditions and insulation configurations to be selected to provide an axial temperature drop of less than 2000K/m with a one-second residence time in the reactor. Final design of the reactor body is in progress. Design of the instrumentation interface with the experiment was initiated. Emphasis was placed on reactants metering and interface requirements for frontlight and backlight holography. Fabrication of the gas phase reactants metering system is in progress as are exploratory studies of particulate phase metering systems. DOE

N81-23219# Physical Sciences, Inc., Woburn, Mass.
PULVERIZED FUEL COMBUSTION: MODELING AND SCALEUP MATHODOLOGIES Quarterly Report, 19 Sep. - 30 Dec. 1980
Paul F. Lewis, Thomas L. Wolf, and Alan Gelb Jan. 1981 23 p refs
(Contract DE-AC22-80PC-30294)
(DOE/PC-30294/1; PSI-TR-253; QR-1) Avail: NTIS HC A02/MF A01

The effort to develop an understanding of the stability and carbon carryover characteristics of pulverized fuel combustors is discussed. This is to be accomplished by improving and extending a model developed for entrained flow coal gasifier analysis by including a better description of the finite rate coal pyrolysis, pyrolysis product chemistry, char reactions, particle-particle interactions, radiative transport and recirculation/mixing. The data to be analyzed with the model includes data from simple (cylindrical symmetry) geometry combustors with premixed and mixing reactants, swirl, and recirculation. The analysis of these

data with the model should lead to an understanding of the effects of fuel type, swirl, recirculation, O/F ratio, and mixing rate on the location (stability) of the flame and the carbon carryover from the combustor. DOE

N81-23220# California Univ., Berkeley. Lawrence Berkeley Lab. Lab. of Chemical Biodynamics.
HOLLOW-FIBER MEMBRANES FOR PHOTOSENSITIZED ELECTRON TRANSPORT
Carl C. Wamser, John W. Otvos, and Melvin Calvin Jan. 1981 31 p
(Contract W-7405-eng-48)
(LBL-12359) Avail: NTIS HC A03/MF A01

Commercially available cellulose acetate hollow fiber membranes were investigated for possible use in artificial photosynthesis solar energy schemes. The function of the membrane is to contain the photosensitizer and to separate the oxidized and reduced species which result from photosensitized electron transfer reactions on each side of the membrane wall. Membranes were successfully modified by a process of soaking in a THF solution saturated with porphyrin, followed by a water rinse. This procedure gives dark purple fibers which contain up to 30 mM zinc tetraphenylporphyrin in the fiber walls. A plumbing system was developed to allow flow of a solution through the inner channels of a 24-fiber bundle while it is immersed in a separate outer solution. Preliminary photochemical studies on cut-up pieces of the treated fiber indicated that it does photosensitize a reaction between EDTA and dimenthyl viologen in aqueous solution. DOE

N81-23221# Ames Lab., Iowa.
ION CHROMATOGRAPHY WITH LOW-CAPACITY RESINS AND LOW CONDUCTIVITY ELUENTS Ph.D. Thesis
D. T. Gjerde 1980 171 p refs
(Contract W-7405-eng-82)
(IS-T-916) Avail: NTIS HC A08/MF A01

Strong base anion exchangers with capacities ranging from 0.04 to 1.46 mequiv./g and from 0.0016 to 0.024 mequiv./g are prepared from Amberlite XAD resins. Distribution ratios of common inorganic and organic anions decrease with decreasing resin capacity, but selectivity coefficients are essentially constant for most of the anions studied. The effect of resin capacity on the distribution ratios for some of the metals that form anionic chloro complexes is also studied. A simple system of anion chromatography is described for the separation and determination of inorganic and organic anions. The anions are separated on a column containing a macroporous anion exchange resin of a low capacity (0.0007 to 0.07 mequiv./g). Only a dilute solution of an aromatic organic acid salt is needed as the eluent. The eluent conductance is sufficiently low so that a suppressor column is not needed and the separated anions can be detected with a simple conductance detector. Numerous examples of actual separations are shown. Equations are developed to help separate difficult mixtures of anions. A system of cation chromatography is described. DOE

N81-23222# California Univ., Berkeley. Lab. of Chemical Biodynamics.
MAGNETIC-FIELD EFFECTS ON PHOTOSENSITIZED ELECTRON TRANSFER REACTIONS
Carl C. Wamser, John W. Otvos, and Melvin Calvin Jan. 1981 15 p refs
(Contract W-7405-eng-48)
(LBL-12361) Avail: NTIS HC A02/MF A01

Reactions which proceed through the intermediacy of a triplet radical pair can be affected by the application of an external magnetic field of relatively low intensity (100 to 1000 gauss). Since many of the photoreactions utilized in solar energy schemes are electron transfer reactions involving triplet radical pairs, experiments were performed with representative photoreactions to determine if such effects could enhance reaction efficiency. No magnetic field effects were observed in any of the experiments, which included the photosensitized reduction of dimethyl viologen sensitized by Ru(bipy) 3 (+2) or by various porphyrins, in homogeneous aqueous solution or in reversed micelles (water in toluene) or on silica particles. Apparently the magnetic field effects reported in the literature are observable only under specific conditions. Under the conditions normally utilized for typical solar energy photoreactions, magnetic field effects do not appear to be useful for optimizing efficiency. DOE

N81-23223# California Univ., Berkeley. Lab. of Chemical Biodynamics.
KINETICS OF PHOTOSENSITIZED ELECTRON TRANSPORT ACROSS A MEMBRANE BOUNDARY
Carl C. Wamser, John W. Otvos, and Melvin Calvin Jan. 1981 16 p
(Contract W-7405-eng-48)
(LBL-12360) Avail: NTIS HC A02/MF A01

A generalized system is described which accomplishes a photosensitized oxidation and reduction and the separation of the resultant oxidized and reduced species across a membrane boundary. A complete reaction mechanism is described and all of the corresponding kinetic steps are defined. A general rate law and a initial rate law are derived by a steady state analysis. Experimental conditions based upon the rate laws which should optimize the reaction efficiency are discussed. DOE

N81-23224# Rensselaer Polytechnic Inst., Troy, N. Y.
CHEMICAL DIFFUSION ON SOLID SURFACES Final Report
John B. Hudson Dec. 1980 10 p refs
(Contracts DE-AS02-77ER-04220; EG-77-S-02-4220)
(COO-4220-4) Avail: NTIS HC A02/MF A01

The techniques of surface science were applied to the problem of the measurement of the surface diffusion rate of an adsorbed species over the surface of a chemically dissimilar material. Studies were carried out for hydrogen and nitrogen adatoms on a Ni(100) surface and for silver adatoms on a sapphire surface. Positive results were obtained only for the case of nitrogen on Ni(100). DOE

N81-23225# State Univ. of New York, Stony Brook.
MULTIPHOTON DISSOCIATION SPECTROSCOPY AND PHOTOCHEMISTRY Progress Report, 15 Jul. 1980 - 15 Mar. 1981
Philip M. Johnson 1981 7 p
(Contract DE-AC02-80ER-10660)
(DOE/ER-10660/1) Avail: NTIS HC A02/MF A01

The apparatus necessary for the proposed experiments on the multiphoton photochemistry of molecules and the detection of radical species are being constructed. This includes the development of a time-of-flight mass spectrometer which operates in conjunction with a supersonic beam, and the construction of a supersonic beam apparatus suitable for use with metastable species and the detection of photofragments. This construction is near completion and we have been able to measure mass spectra with good resolution and sensitivity. We have also been developing our capacity for doing multiple laser experiments, which are particularly necessary in this work. DOE

N81-23226# State Univ. of New York, Stony Brook.
CHEMICAL REACTION AND TURBULENCE Progress Report, 1 Jun. 1980 - 31 May 1981
R. Chevray Jan. 1981 23 p refs
(Contract DE-AC02-79ER-10439)
(DOE/ER-10439/2) Avail: NTIS HC A02/MF A01

Experimental techniques were developed both for the velocity and concentration fluctuation measurements. The calculations of the reacting mixing layer indicate that the region of interest, where finite rates play a role, is 0.3 < x/ sup */ < 10.0. With U1 = 5 m/s, and an ozone concentration of 0.1 percent this range is 0.4 cm < x < 12.5 cm. For the conditions stated, at x/sup */ = 5 the mixing layer thickness is just 4 mm and the ratio of laminar to turbulent viscosity is 0.1. It should be noted that the modeling assumes a high Reynolds number throughout and is likely to be inaccurate in the developing region. The profiles of < c(eta, x/sup */) > shown also indicate that this quantity is not very sensitive to the modeling of the finite-rate reaction. The difference of 20 percent is most likely less than the combined uncertainty in the measurements and the turbulence mode. On the other hand, the profile of < c prime (2) > and R/sub cf/ shows some interesting trends which are likely to depend on the details of the modeling. DOE

N81-23227# Argonne National Lab., Ill. Applied Mathematics Div.

EFFECTS OF CURVATURE ON ASYMMETRIC STEADY STATES IN CATALYST PARTICLES

Bradley J. Lucier Feb. 1981 25 p refs
(Contract W-31-109-eng-38)
(ANL-81-7) Avail: NTIS HC A02/MF A01

The effects of curvature on steady states of chemical catalytic reactions are investigated by studying the cases of the catalytic particle being a spherical or cylindrical shell. Existence and stability of solutions are studied. It is shown that the solutions converge to the solutions for the catalytic slab when the curvature goes to 0 in each case. DOE

N81-23228# Brookhaven National Lab., Upton, N. Y.

APPLICATION OF PIXE, RBS AND HIGH ENERGY PROTON MICROBEAMS TO THE ELEMENTAL ANALYSIS OF COAL AND COAL WASTE

H. W. Kraner, A. L. Hanson, K. W. Jones, S. A. Oakley, I. W. Duedall, and P. M. J. Woodhead 1980 17 p refs Presented at the Atomic and Nucl. Methods in Fossil Energy Res. Meeting, Mayaguez, Puerto Rico, 1-4 Dec. 1980 Prepared in cooperation with State Univ. of New York, Stony Brook
(Contract DE-AC02-76CH-00016)
(BNL-28668; CONF-801227-3) Avail: NTIS HC A02/MF A01

Proton and X-ray induced X-ray emission have proved to be sensitive and convenient methods to measure major trace element concentrations in bulk quantities of coal and coal waste materials. The PIXE measurements were made with the proton beam in air in a microprobe configuration. Collimated proton beam scans were made on several thin sections of fly ash/sludge block materials and good trace sensitivities were observed for small specific volumes; SEM scans showed a high degree of material homogeneity which precluded significant elemental variations at about the 100 micrometer spatial resolution used. Rutherford backscattering was used to directly observe major and minor elemental concentrations in coal waste materials and in several representative ranks of coal and it is useful for only trace concentrations of heavy elements, but it does provide a method independent of fluoresced X-rays for detection of possible middle Z interferences. DOE

N81-23229# Cornell Univ., Ithaca, N. Y. Dept. of Chemistry.

ESR STUDIES OF SURFACE ADSORPTION AND CATALYSTS UNDER ULTRAHIGH VACUUM CONDITIONS

Progress Report, 1 Mar. 1980 - 29 Feb. 1981

Jack H. Freed Nov. 1980 53 p refs
(Contract DE-AS02-78ER-04991)
(DOE/ER-04991/2) Avail: NTIS HC A04/MF A01

An electron spin resonance (ESR) technique was developed for the study of surface adsorption and catalysis on clean, well characterized metallic and oxide surfaces under ultrahigh vacuum (UHV) conditions. The results were compared with real surfaces which are important in actual catalysis. Results with ESR-UHV system on the NO2/Cu system showed that only in the presence of H2O can the surface process(es) proceed that lead to stable Cu(2+) complexes which are observable by ESR. By monitoring the cyclotron resonance from microwave induced secondary electron emissions threshold, definite evidence for the oxidation of the Cu surface by the clean NO2 was obtained. In real systems, as opposed to the clean surfaces prepared under UHV conditions, small amounts of H2O are usually present. The UHV studies permitted a demonstration of the reactivity requirements. DOE

N81-23230# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.

SURFACE SCIENCE AND HETEROGENEOUS CATALYSTS

G. A. Somorjai May 1980 37 p refs Presented at the Conf. of the Chem. Soc. of Switz., Zurich, 14 May 1980
(Contract W-7405-eng-48)
(LBL-11690; CONF-8005136-1) Avail: NTIS HC A03/MF A01

The catalytic reactions studied include hydrocarbon conversion over platinum, the transition metal catalyzed hydrogenation of carbon monoxide, and the photocatalyzed dissociation of water over oxide surfaces. The method of combined surface science and catalytic studies is similar to those used in synthetic organic chemistry. The single crystal models for the working catalyst are compared with real catalysts by comparing the rates of cyclopropane ring opening on platinum and the hydrogenation of carbon monoxide on rhodium single crystal with those on practical commercial catalyst systems. Excellent agreement was obtained for these reactions. DOE

N81-23231# National Inst. for Environmental Studies, Tsukuba (Japan). Div. of Chemistry and Physics.

MULTIELEMENT ANALYSIS STUDIES BY FLAME AND INDUCTIVELY COUPLED PLASMA SPECTROSCOPY UTILIZING COMPUTER-CONTROLLED INSTRUMENTATION

Furuta Naoki 1980 97 p refs
(PB81-149528; R-12-80) Avail: NTIS HC A05/MF A01 CSCL 07D

Analytical studies concerned with multielement analysis by atom spectoscopic methods are described. The significance of multielement analysis, and classification of the analytical techniques, the excitation sources and the measurement system are discussed. The instrument consists of an ICP source, programmable monochromator, and SIT-OMA detector. The analytical performance of the SIT-OMA detector is considered when combined with the programmable monochromator by using nitrous oxide-acetylene flame as an excitation source. The analytical performance was improved by replacing nitrous oxide-acetylene flame with an ICP source. GRA

N81-23232# Bureau of Mines, Albany, Oreg. Albany Research Center.

PARTIAL PRESSURES OF GASEOUS HCl AND H2O OVER AQUEOUS SOLUTIONS OF HCl, AlCl3, AND FeCl3

N. A. Gokcen 1980 24 p refs
(PB81-147381; BM-RI-8456) Avail: NTIS HC A02/MF A01 CSCL 08I

Equilibrium partial pressures of gaseous HCl and H2O over aqueous binary and ternary solutions of HCl and AlCl3 were calculated or estimated in the range of 20 to 110 C, and up to saturation with AlCl3-6H2O. The results were extended to solutions containing less than 10 wt % FeCl3 by assuming that FeCl3 and AlCl3 are equivalent on the molar basis, since both salts have trivalent cations with a common anion. The ionic activity coefficient of HCl and the equilibrium constant for dissolution of gaseous HCl were computed. GRA

N81-23233# Bureau of Mines, Pittsburgh, Pa. Pittsburgh Research Center.

THE THEORY OF FLAMMABILITY LIMITS. CONDUCTIVE-CONVECTIVE WALL LOSSES AND THERMAL QUENCHING

Martin Hertzberg 1980 33 p refs
(PB81-150047; BM-RI-8469) Avail: NTIS HC A03/MF A01 CSCL 08I

The concept of limit burning velocities, is applied to the problem of flame propagation through tubes of finite size. The limit burning velocity for conductive-convective wall-loss quenching is determined mainly by the ratio of contact perimeter loss area to flame zone cross sectional area. This ratio of loss area to propagation area relates to the shape of the flame front and its control by buoyance and by boundary conditions. The comparison of (Su)b with previously defined limit velocities for systems mixed by natural convection allows one to assess the influence of tube dimensions and boundary constraints on the 'true' or earthly limits for the three directions of propagation. The flame quenching caused by inert powders is shown to be similarly described in terms of a limit burning velocity, (Su)b. The tube's surface-to-volume ratio is simply replaced by the powder's surface area per unit volume of the flammable mixture. Thermal loss quenching by these 'internal walls' occurs at a critical Peclet constant somewhat higher than that observed for tubes, and the problem is complicated by the finite heat capacities of the powders and particle lag effects in the flame front. GRA

N81-23234# Bureau of Mines, Pittsburgh, Pa.

CONTROLLED BURNOUT OF WASTED COAL ON ABANDONED COAL MINE LANDS

Robert F. Chaiken 1980 29 p refs
(PB81-148231; BM-RI-8478) Avail: NTIS HC A03/MF A01 CSCL 13B

An approach to eliminating environmental and public safety hazards associated with fires in abandoned coal mines and waste banks involves the use of in situ combustion technology developed by the Federal Bureau of Mines to accelerate the burning of the wasted coals in place. This technology is used under exhaust ventilation control conditions that allow for total management of the hot gases produced. Combustion stoichiometries are optimized to minimize unburnt combustibles and to maximize the heat content of the gas products, which are exhausted at one or more fan locations. When necessary, scrubber systems are employed to remove air pollutants, such as sulfur dioxides; heat utilization systems are also employed to offset operational costs. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N81-23235 Northeastern Univ., Boston, Mass.
AMORPHOUS AND MICROCRYSTALLINE THIN FILMS OF IRON-BASE ALLOYS FOR CORROSION RESISTANT COATINGS Ph.D. Thesis
Boniface Adeh Okorie 1980 279 p
Avail: Univ. Microfilms Order No. 8107000

Amorphous and microcrystalline thin films of chromium bearing iron alloys were produced by ion plating and electrochemical tests show that they exhibit very high resistance to pitting corrosion in 1M NaCl solutions. Electrochemical potentiostatic, potentiodynamic and transient current behaviors of these films are reported. A preliminary study of the effect of macropinholes in the ion plated films on the protection of substrate materials against attack was carried out. The results suggest that the presence of a limited number of microscopic pinholes has no adverse effect. Dissert. Abstr.

N81-23236 Pennsylvania Univ., Philadelphia.
EMBRITTLEMENT OF HIGH-STRENGTH STEELS: EFFECTS OF IMPURITIES AND HYDROGEN Ph.D. Thesis
Nikhiles Bandyopadhyay 1980 241 p
Avail: Univ. Microfilms Order No. 8107715

The fracture behavior of 4340-type steels at various test temperatures of laboratory and commercial heats and of a plain-carbon steel, all quenched to form martensite and tempered at various temperatures below 525 C is studied. The toughness trough associated with tempered martensite embrittlement (TME) was observed in the commercial steels, but was absent in a pure laboratory heat free of Mn and Si. However, tests at 77 K, showed a trough even for the pure heat and the trough was found to be associated with about 20% intergranular fracture. Additional results suggest that TME is mainly due to grain boundary weakening by segregated sulfur and phosphorus, and it is triggered by carbide formation at tempering temperatures above 150 C. Carbide formation is a necessary, but not sufficient condition for this type of embrittlement. The behavior of these steels in a gaseous hydrogen atmosphere was found to be extremely sensitive to small changes in composition, yield strength, and hydrogen fugacity or pressure. Other results are detailed. Dissert. Abstr.

N81-23237 Wisconsin Univ. - Madison.
THERMAL ANALYSIS OF MALLEABLE BASE WHITE IRON FOR QUALITY CONTROL Ph.D. Thesis
Udomswat Ekpoom 1980 225 p
Avail: Univ. Microfilms Order No. 8105271

The effects of metallurgical processing variables on solidification changes in malleable base white irons and their possible correlation with casting defects were studied. Equipment was built to record thermocouple output on cassette tape so that it could be subsequently digitalized and mathematically manipulated via computers to yield the best cooling curve, the derived cooling curve, the inverse rate curve, and modified DTA techniques. Advantages and limitations of each technique were addressed. The modified DTA technique was chosen as the most useful. The DTA modification consisted of plotting difference in heat evolved per unit weight per unit time vs. temperature instead of difference in temperature vs. temperature of a reference neutral body. The reference in the modified DTA was the cooling of the iron without heat evolution from solidification or transformation where in the reference iron was calculated from Newtonian heat transfer analysis which was proved to be valid. Dissert. Abstr.

N81-23238 Michigan Technological Univ., Houghton.
THE ELASTO-PLASTIC BEHAVIOR OF INCLUSIONS Ph.D. Thesis
William Craig Johnson 1980 209 p
Avail: Univ. Microfilms Order No. 8107139

Complete solutions to the displacement, stress and strain fields, plastic zone size, and misfit energy are calculated for an isotropic misfitting spherical precipitate under the assumptions of von Mises' yield criterion and incremental plasticity. Analytical solutions are obtained for linear strain hardening while a simple numerical technique is derived for the case of power law hardening. The energy of the relaxed state is found to be a strong function of the strain hardening parameter while the plastic zone size is not. The traditional continuum mechanics approach to determining plastic zone size is independent of precipitate size, in direct contradiction with experimental findings. Consequently, a dislocation approach was developed in an attempt to explain the dependency of plastic zone size on precipitation size and misfit for a spherical precipitate. Dissert. Abstr.

N81-23239 Ohio State Univ., Columbus.
GASEOUS SULFIDATION OF PURE MOLYBDENUM AT 700 DEG - 950 DEG C Ph.D. Thesis
Bom Soon Lee 1980 167 p
Avail: Univ. Microfilms Order No. 8107357

The kinetics and mechanism of sulfide scale growth on pure molybdenum were investigated in an elemental sulfur and H2/H2S gas mixture atmosphere for the temperature range of 700 to 950 C. Linear kinetics were observed for the lower temperatures of 700 to 750 C; the kinetics became parabolic at higher temperatures of 850 to 950 C. Beneath the MoS2 scale formed at higher temperatures, a very thin layer of different morphology was found and indexed by X-ray diffraction as Mo2S3. At extended times, rate control is provided by sulfur diffusion through the inner Mo2S3 layer. The parabolic rate constants of sulfidation in H2/H2S gas mixtures were about one order of magnitude higher than those from elemental sulfur experiments. Dissert. Abstr.

N81-23240 Ohio State Univ., Columbus.
SOLID-STATE DISPLACEMENT REACTIONS BETWEEN IRON AND NICKEL OXIDE AT 1000 C Ph.D. Thesis
Chanvootti Tangchitivittaya 1980 188 p
Avail: Univ. Microfilms Order No. 8107402

The displacement reaction between Fe and NiO at 1000 C results in three adherent, two phase interwoven aggregate product zones, namely, austenite (gamma)-wustite, gamma-spinel, and gamma-Fe doped NiO. The gamma-wustite aggregate is the dominant product. All of the interwoven product zones are characterized metallographically and mechanisms for their formation are delineated. The reaction front is in the Fe doped NiO phase where gamma tentacles grow by tortuous oscillation in a three dimensional manner into the Fe doped NiO phase upon localized reduction and withdrawal of Ni ions from this phase. The rates of growth of product phases, which follow a parabolic rate law, are found to be controlled by the series solid state diffusion of Fe ions through the wustite, spinel, and NiO phases. The growth rate of the overall product zone is comparable to the rate of scaling of Fe in gaseous oxygen. Dissert. Abstr.

N81-23241 Michigan Technological Univ., Houghton.
THE RELATIONSHIP BETWEEN DEFORMATION AND FRACTURE IN TWO PHASE ELASTO-PLASTIC EQUIAXED ALLOYS Ph.D. Thesis
Marek A. Przystupa 1980 103 p
Avail: Univ. Microfilms Order No. 8107134

Deformation, fracture initiation, and fracture propagation in two phase elastoplastic equiaxed alloys was analyzed. In the case of alloys with elastic inclusions in a plastically deformed matrix the Argon, Im, and Safoglu treatment of fracture initiation

in connection with Rice's fracture mechanics approach of crack propagation allows for the calculation of the distribution of fractured particles as a function of alloy strain and, consequently, prediction of both tensile strengths and fracture toughnesses of these alloys. Predicted values are related to a heavily deformed zone correction factor which depends upon microstructural features. Fracture of alloys with plastically deforming inclusions in an elastic matrix were described utilizing the concept of process zone in conjunction with Tardiff's approach of crack closing forces arising from unbroken ductile particles surrounded by a fractured brittle matrix. The present model relates, in a quantitative form, the fracture toughness to the simple mechanical characteristics of the constituents, such as their fracture toughness and tensile properties, and to the particle-matrix interfacial strength.
Dissert. Abstr.

N81-23242*# Boeing Co., Seattle, Wash. Research and Engineering Div.

FLAW GROWTH OF 6AI-4V STA TITANIUM IN NITROGEN TETROXIDE WITH LOW NITRIC OXIDE CONTENT Final Report

W. D. Bixler May 1972 37 p refs
(Contract NAS9-10364)
(NASA-CR-160945; D180-14853-1) Avail: NTIS HC A03/MF A01 CSCL 11F

The sustained load flow growth characteristics of surface flowed 6AI-4V STA titanium specimens were determined when exposed to nitrogen tetroxide N2O4 having nitric oxide (NO) concentrations of 0.06 to 0.30%. Test temperatures ranged from 70 to 150 F. It was observed that the threshold stress intensity for the titanium decreased abruptly below on NO concentration of 0.18% and also decreased as the temperature increased. The threshold stress intensity was determined to be greater than or equal to 60% of the critical stress intensity for NO concentrations of 0.18 to 0.30% and temperatures of 90 and 120 F. Sustained load tests conducted in N2O4 vapor with a 0.30% NO concentration at 120 F indicated the threshold to be also greater than or equal to 60% of critical. Author

N81-23243*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMBUSTION SYSTEM PROCESSES LEADING TO CORROSIVE DEPOSITS

Carl A. Stearns, Fred J. Kohl, and Daniel E. Rosner (Yale Univ.,) 1981 25 p refs Presented at the NACE Intern. Conf. on High Temp. Corrosion, San Diego, Calif., 2-6 Mar. 1981
(Contract EF-77-A-01-2593)
(NASA-TM-81752; DOE/NASA/2593-27; E-744) Avail: NTIS HC A02/MF A01 CSCL 11F

Degradation of turbine engine hot gas path components by high temperature corrosion can usually be associated with deposits even though other factors may also play a significant role. The origins of the corrosive deposits are traceable to chemical reactions which take place during the combustion process. In the case of hot corrosion/sulfidation, sodium sulfate was established as the deposited corrosive agent even when none of this salt enters the engine directly. The sodium sulfate is formed during the combustion and deposition processes from compounds of sulfur contained in the fuel as low level impurities and sodium compounds, such as sodium chloride, ingested with intake air. In other turbine and power generation situations, corrosive and/or fouling deposits can result from such metals as potassium, iron, calcium, vanadium, magnesium, and silicon. Author

N81-23244*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THE FRACTURE MORPHOLOGY OF NICKEL-BASE SUPERALLOYS TESTED IN FATIGUE AND CREEP-FATIGUE AT 650 C

John Gayda and Robert V. Miner Apr. 1981 26 p refs
(NASA-TM-81740; E-793) Avail: NTIS HC A03/MF A01 CSCL 11F

The fracture surfaces of compact tension specimens from seven nickel-base superalloys fatigue tested at 650 C were studied by scanning electron microscopy and optical metallography to determine the nature and morphology of the crack surface in the region of stable growth. Crack propagation testing was performed as part of an earlier study at 650 C in air using a 0.33 Hz fatigue cycle and a creep-fatigue cycle incorporating a 900 second dwell at maximum load. In fatigue, alloys with a grain size greater than 20 micrometers, HIP Astrology, Waspaloy, and MERL 76, exhibited transgranular fracture. MERL 76 also displayed numerous fracture sites which were associated with boundaries of prior powder particles. The two high strength, fine grain alloys, IN 100 and NASA IIB-7, exhibited intergranular fracture. Rene 95 and HIP plus forged Astrology displayed a mixed failure mode that was transgranular in the coarse grains and intergranular in the fine grains. Under creep-fatigue conditions, fracture was found to be predominantly intergranular in all seven alloys. L.F.M.

N81-23245*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SYNERGISTIC EROSION/CORROSION OF SUPERALLOYS IN PFB COAL COMBUSTOR EFFLUENT

S. M. Benford, G. R. Zellars, and C. E. Lowell 1981 27 p refs Presented at 82d Ann. Meeting of the Am. Ceramic Soc., Chicago, 28-30 Apr. 1981
(NASA-TM-81715; E-748) Avail: NTIS HC A03/MF A01 CSCL 11F

Two Ni-based superalloys were exposed to the high velocity effluent of a pressurized fluidized bed coal combustor. Targets were 15 cm diameter rotors operating at 40,000 rpm and small flat plate specimens. Above an erosion rate threshold, the targets were eroded to bare metal. The presence of accelerated oxidation at lower erosion rates suggests erosion/corrosion synergism. Various mechanisms which may contribute to the observed oxide growth enhancement include erosive removal of protective oxide layers, oxide and subsurface cracking, and chemical interaction with sulfur in the gas and deposits through damaged surface layers. Author

N81-23246# Mar-Test, Inc., Cincinnati, Ohio.

HIGH TEMPERATURE LOW CYCLE FATIGUE DATA FOR THREE HIGH STRENGTH NICKEL-BASE SUPERALLOYS Final Report, May 1976 - Sep. 1978

J. B. Conway and R. H. Stentz Jun. 1980 119 p refs
(Contracts F33615-76-C-5245; F33615-76-C-5191; AF Proj. 2307)
(AD-A097430; AFWAL-TR-80-4077) Avail: NTIS HC A06/MF A01 CSCL 11/6

This report presents a summary of the high temperature low cycle fatigue data for three high strength nickel-base superalloys, Rene 95, AF-115, and AF2-1DA. The majority of tests were performed in strain control at 1200 F and 1400 F, and at frequencies of 20 cpm, 0.2 cpm, and 0.05 cpm. Conventional triangular waveform was used for most of the testing although strain dwell tests and some SLOW-FAST and FAST-SLOW tests were also included. GRA

N81-23247# Technion - Israel Inst. of Tech., Haifa. Dept. of Materials Engineering.

MICROSTRUCTURAL CHANGES FOLLOWING SUPERPLASTIC DEFORMATION OF COMMERCIALLY PURE TITANIUM Final Report, 1 Feb. - 31 Jan. 1981

Abraham Rosen, J. W. Hall, T. Livni, and E. Ganin 15 Mar. 1981 12 p refs
(Grant AF-AFOSR-0132-80; AF Proj. 2301)
(AD-A097277; Rept-040-210; EOARD-TR-81-2) Avail: NTIS HC A02/MF A01 CSCL 11/6

Small specimens of commercially pure titanium have been subjected to creep testing in a specially designed furnace at temperatures between 815 and 925 C, followed by rapid cooling to room temperature. The characteristic failure mode was found to be dependent upon temperature and creep stress, at low temperature and/or high stress specimens developed a long diffuse neck whereas at high temperature and/or low stress a short localized neck developed. After testing specimens were examined by optical and electron microscopy. Dynamic recrystallization was observed in some of the former type of test piece. A tentative rationale for the observed behavior is proposed on the basis of the strain rate sensitivity of the flow stress and the occurrence of grain growth. Author (GRA)

N81-23248# Naval Research Lab., Washington, D. C.

ENVIRONMENTAL EFFECTS ON FATIGUE BEHAVIOR OF METALS

P. Shahinian and K. Sadananda 9 Apr. 1981 33 p refs
(AD-A097546; NRL-MR-4495) Avail: NTIS HC A03/MF A01 CSCL 11/6

Advances in our knowledge of the influence of environment on fatigue properties in recent years are reviewed. Much of this has occurred as a result of increased activity in development of water and gas nuclear reactors, heat transfer systems, and offshore structures. Effects of both aqueous and gaseous environments on crack initiation and propagation as well as fatigue life in principally steels, aluminum alloys, and titanium alloys are discussed including the role of environmental factors such as electrochemical potential, solution chemistry, gaseous species, and temperature. Mechanical factors such as frequency and loading waveform are also important in the response of material behavior to environment. Author (GRA)

N81-23249# Aeronautical Research Labs., Melbourne (Australia).
FATIGUE LIFE VARIABILITY IN ALUMINUM ALLOY AIRCRAFT STRUCTURES
G. S. Jost and S. P. Costolloe Jan. 1980 24 p refs
(AD-A097198; ARL/STRUC-381) Avail: NTIS HC A02/MF A01 CSCL 11/6

A survey of variability in the fatigue lives of aluminium alloy aircraft structures tested under gust and maneuver loadings using programmed and random sequences has shown that scatter associated with gust loading is significantly higher than that for maneuver loading. By contrast, there appears to be no systematic effect of loading sequence. The data have been treated both as lognormal and Weibull distributed. Author (GRA)

N81-23250# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
SULFIDE INCLUSIONS IN ELECTROSLAG REMELTED STEELS Final Report, Dec. 1977 - Dec. 1979
M. D. Boldy, T. Fujii, D. R. Poirier, and M. C. Flemings Watertown, Mass. Army Materials and Mechanics Research Center Jan. 1981 125 p refs
(Contract DAAG46-78-C-0032; DA Proj. 1L1-61102-AH-42)
(AD-A097469; AMMRC-TR-81-4) Avail: NTIS HC A06/MF A01 CSCL 11/6

The relationships among heat treatment, sulfide inclusion distribution and chemistry were investigated in this work, and the problem of overheating found to be directly related to these parameters. A basis for comparison was found in microscopic examination of carbon extraction replicas from commercially produced electroslag remelted steel. This showed a direct correlation between sulfide inclusion distribution and overheating. Further investigation characterized a critical cooling rate necessary for overheating to occur. Methods for eliminating the problem of sulfide inclusions in ESR steels were examined in detail. The simplest is to alter the cooling rate through the overheating range. Either a fast or a very slow cool eliminates the problem. An alternate method of eliminating the problem is to change the chemistry of the steel. These different compositions were examined in this work. All three were tested and proved to be successful in eliminating the sulfide problem. In an associated study a model to simulate the diffusion controlled coarsening and dissolution kinetics of particles within a metallic matrix was formulated. Calculations were made and compared with experiments in a model system and on manganese sulfide inclusions in iron. The effect of composition of manganese and of sulfur content was studied. Agreement of calculations is good.
Author (GRA)

N81-23251# Metallurgical Consultants, Inc., Montebello, Calif.
MANUFACTURING PROCESS FEASIBILITY STUDY
Harold Graper 30 Oct. 1980 7 p
(Contract W-7405-eng-48)
(UCRL-15319) Avail: NTIS HC A02/MF A01

A series of four simulated mitigator brazements were fabricated using a number 304 slide blanks, skin, and solarib. The solarib was brazed with AMI-915 alloy. Four specimens were taken from each cylinder, two from each band of solarib and shear tested. Charted test results are attached. DOE

N81-23252# Failure Analysis Associates, Palo Alto, Calif.
COST-EFFECTIVENESS OF COUNTERMEASURES TO INTERGRANULAR STRESS CORROSION CRACKING IN BWR PIPING Final Report
E. D. Eason, S. B. Brown, and J. M. Thomas Feb. 1981 70 p refs
(EPRI Proj. 700-6)
(EPRI-NP-1703) Avail: NTIS HC A04/MF A01

The need for pipe repairs due to intergranular stress corrosion cracking (IGSCC) is estimated, and the repair rate is predicted to increase with plant age. The expected cost of repairs is calculated for an average plant using a life-cycle economic model. The calculated repair costs, $8.9 million (in the absence of countermeasures) is sensitive to the economic scenario, the fraction of repairs that force outages, and the average repair time. The value of an IGSCC countermeasure is equal to the reduction in repair costs that results from implementing that countermeasure. The reduction in repair cost varies linearly with effectiveness; for a 100 percent effective countermeasure (i.e., no future repairs), the value is $8.9 million per plant. The sensitivity of the results to several uncertainties is analyzed, leading to +470, -83 percent bounds on the baseline estimates. DOE

N81-23253# Metal Properties Council, Inc., New York.
PROGRAM TO DISCOVER MATERIALS SUITABLE FOR SERVICE UNDER HOSTILE CONDITIONS OBTAINING IN EQUIPMENT FOR THE GASIFICATION OF COAL AND OTHER SOLID FUELS Quarterly Progress Report, 1 Jul. - 30 Sep. 1980
A. O. Schaefer, ed. Sep. 1980 149 p Prepared for Union Carbide Corp. and Gas Research Inst.
(Contracts DE-AC05-76ET-10670; EX-76-C-01-1784)
(FE-1784-69) Avail: NTIS HC A07/MF A01

The progress on a program designed to screen materials for use in coal gasification plants with respect to the various unique corrosive environments obtaining therein and to provide useful corrosion data as well as reliable information on other properties needed for the design, construction, and operation of such plants is reported. A summary of achievements is followed by detailed results of corrosion testing of selected materials. DOE

N81-23254# International Nickel Co., Inc., Suffern, N. Y. Research and Development Center.
WELD OVERLAYING FOR CORROSION RESISTANCE IN COAL-GASIFICATION ATMOSPHERES Final Report, 15 Aug. 1977 - 15 Aug. 1979
Edward P. Sadowski 1979 268 p refs
(Contracts DE-AC01-77ET-10496; EF-77-C-01-2621)
(FE-2621-15) Avail: NTIS HC A12/MF A01

Two nickel-base filler metals designed to deposit high Cr and Cr-Al contents were used to surface Types 303L and 310 stainless steel (SS) and INCOLOY alloy 800H. Single and double layers of high chromium filler were deposited successfully using three weld processes: submerged-arc, gas metal-arc and gas tungsten-arc with a hot wire addition. The compositions of the deposited overlays were affected by the compositions of the filler metal and substrate, the percentage dilution, the percentage recovery of elements across the arc, and the composition of the flux used with the submerged arc welding process. All surfaced substrates had better corrosion resistance than the unprotected substrates when exposed for 1000 hours in a coal gasification atmosphere (CGA) at 982OC (1800OF). The different filler metals, substrates or welding processes evaluated did not affect the as-welded room temperature tensile properties of composite specimens of overlay and substrate. DOE

N81-23255# California Univ., Berkeley. Materials and Molecular Research Div.
MECHANISMS OF EROSION/CORROSION OF METALS AND THEIR OXIDE SCALES
A. Levy, R. Bellman, Jr., and J. Maasberg Dec. 1980 28 p refs Submitted for publication
(Contract W-7405-eng-48)
(LBL-12023) Avail: NTIS HC A03/MF A01

The basic mechanisms of degradation that occur when a small particle impact on a bare metal surface or on one that contains a thin oxide scale were examined in order to provide the basis for selecting operating conditions and developing more resistant materials for coal gasifiers. The work to date indicates that significant differences in erosion behavior occurs as the

result of different elevated temperature corrosion conditions forming different scale and interface compositions and morphologies. Generally the differences are relatively minor. Yet, under conditions of combined erosion corrosion, these differences could become important. Even though the scales were thin and on ductile matrices, their erosion behavior variation with impingment angle was that of a brittle rather than a ductile material. The use of erosion tests to study the adherence of various scales has some merit, however, interpretation of some of the smaller differences could be difficult. DOE

N81-23256# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy.

LOCALIZED CORROSION IN MATERIALS FOR GEOTHERMAL POWER

A. Roy, J. A. Peterson, R. F. Hehemann, and A. R. Troiano Dec. 1980 90 p refs Prepared in cooperation with Armco Steel Corp., Middletown, Ohio

(Contract DE-AS02-76ET-28317; EY-76-S-02-2602)

(DOE/ET-28317/T1) Avail: NTIS HC A05/MF A01

Ten different commercially available steels were examined for general and localized corrosion in 14 different environmental conditions. The influence of chloride was minor and seemed slightly more agressive at 1 than at 5 or 24 percent. Saturation of the brines with H2S increased the general corrosion rate but appeared to reduce crevice attack in the acid solutions. A neutral brine with or without H2S greatly reduced all forms of attack. Tests at 1500 C exhibited greater attack than at ambient. A relatively new alloy, Ni-Cu-Cb, consistently demonstrated good resistance to both general and localized attack. Typical economical N80 grade steels demonstrated the strong dependence of localized attack on inclusion variables. The Cr-Mo steels surprisingly did not look good at ambient but exhibited substantial improvement at 1500 C. The laboratory tests gave higher weight loss values for similar steels recently tested in a well; although in neutral brines without saturated H2S, the difference was not significantly larger. DOE

N81-23257# Colorado State Univ., Fort Collins. Dept. of Chemistry.

METALLIC SPECIES DERIVED FROM FLUIDIZED BED COAL COMBUSTION Final Report

David F. S. Natusch and David R. Taylor 1980 110 p refs

(Contracts DE-AS21-77MC-08196; EY-77-S-21-8196)

(DOE/MC-08196/T1) Avail: NTIS HC A06/MF A01

Samples of fly ash generated by the combustion of Montana Rosebud coal in an experimental 18 inch fluidized bed combustor were collected. The use of a heated cascade impactor permitted collection of size fractionated material that avoided condensation of volatile gases on the particles. Elemental concentration trends were determined as a function of size and temperature and the results compared to published reports for conventional power plants. The behavior of trace metals appears to be substantially different in the two systems due to lower operating temperatures and the addition of limestone to the fluidized bed. Corrosion of the impactor plates was observed at the highest temperature and lowest limestone feed rate sampled during the study. Data from the elemental concentration and leaching studies suggest that corrosion is most likely due to reactions involving sodium sulfate. However, it is concluded that corrosion is less of a potential problem in fluidized bed systems than in conventional coal fired systems. DOE

N81-23258# Ohio State Univ., Columbus. Dept. of Metallurgical Engineering.

HYDROGEN ATTACK OF PRESSURE-VESSEL STEEL Progress Report, 1 Apr. 1980 - 31 Mar. 1981

Paul G. Shewmon Dec. 1980 11 p refs

(Contract DE-AS02-76ER-02872)

(DOE/ER-02872/5) Avail: NTIS HC A02/MF A01

The nucleation and growth of methane bubbles in the hydrogen attack of pressure vessel steel has been shown to obey models developed to describe the growth of bubbles limiting the creep ductility of metals. This has been done through studies of the effect of prior deformation on bubble nucleation as well as the effect of methane pressure (stress) and temperature on growth kinetics. A comprehensive model of the factors limiting growth has been developed. Its application to the hydrogen attack of a 2 1/4 Cr-1 Mo steel leads to several interesting predictions. DOE

N81-23259# Ames Lab., Iowa. Nuclear Engineering Dept.

HARDNESS TESTS ON IRRADIATED PRESSURE VESSEL STEEL M.S. Thesis

David James Harvey 1980 76 p refs

(Contract W-7405-eng-82)

(IS-T-942) Avail: NTIS HC A05/MF A01

The three heats of pressure vessel steel all showed, approximately, a 10 percent increase in the average weld metal hardness when irradiated to a fluence of about 1 x 10(18) n/cm(2), E greater than MeV; the activation energy, as determined by the Meechan-Brinkman method, for the recovery of radiation induced hardness was found to be 0.60 + or - 0.06 eV; and the activation energy of 0.6 eV is approximately equal to that calculated for vacancy migration in alpha iron, suggesting that the radiation produced defect clusters are vacancy in nature. DOE

N81-23260# Sandia Labs., Albuquerque, N. Mex. Mechanical Metallurgy Div.

PHYSICAL AND MECHANICAL PROPERTIES OF CAST 17-4 PH STAINLESS STEEL

H. J. Rack Feb. 1981 63 p refs

(Contract DE-AC04-76DP-00789)

(SAND-80-2302; TTC-0161) Avail: NTIS HC A04/MF A01

The physical and mechanical properties of an overaged 17-4 PH stainless steel casting were examined. The tensile and compressive properties of cast 17-4 PH are influenced to a slight degree by changing test temperature and strain rate. However, both the Charpy impact energy and dynamic fracture toughness exhibit a tough-to-brittle transition with decreasing temperature - this transition being related to a change in fracture mode from ductile, dimple to cleavage-like. Although the overaged 17-4 PH casting had a relatively low room temperature Charpy impact energy, when compared to wrought 17-4 PH, its fracture toughness was at least comparable to that of wrought 17-4 PH. DOE

N81-23261# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.

LOCALIZED CORROSION AND STRESS-CORROSION CRACKING BEHAVIOR OF STAINLESS STEEL WELDMENTS Annual Progress Report, 1 Jun. 1980 - 28 Feb. 1981

W. F. Savage and D. J. Duquette Feb. 1980 44 p refs

(Contract DE-AS02-76ER-02462)

(DOE/ER-02462/T1) Avail: NTIS HC A03/MF A01

Pitting corrosion experiments were conducted on 308L stainless steel as a function of alloy microstructure (% delta ferrite) in acidified water-methanol solutions. Slow strain rate stress corrosion cracking studies were performed on single phase and duplex 304 stainless steels as functions of solution chemistry, temperature, and sensitization. DOE

N81-23262# Northwestern Univ., Evanston, Ill.

STUDIES OF METAL: SEMICONDUCTOR INTERFACES IN CATALYSIS AND ENERGY CONVERSION Annual Report, 15 Jun. 1980 - 14 Jun. 1981

Y. W. Chung Feb. 1981 30 p refs

(Contract DE-AS02-78ER-04946)

(COO-4946-3) Avail: NTIS HC A03/MF A01

It was shown that CO hydrogenation reactions can be performed reproducibly on a small area well characterized Ni (111) single crystal using an isolation cell technique. The activation energy for methane production (24.7 kcal/mole) and other hydrocarbon product distribution are in excellent agreement with the literature. It was demonstrated that Ni dispersed onto TiO2 (100) acquires a negative charge and that the Ni/TiO2 (100) exhibits a methanation activity at least 4 times that of Ni(111) with about the same activation energy. The Ni/TiO2 also produces more higher hydrocarbons than Ni(111). The photochemical activity of Pt/SrTiO3 in both aqueous solutions and in gas phase water was examined. The activity in aqueous solutions under different conditions of pH and Pt coverage can be explained by band bending effects. A low hydrogen yield was observed in the presence of water vapor; this was attributed to a slow photo-regeneration of active surface Ti(3). DOE

N81-23263# Bureau of Mines, Rolla, Mo. Rolla Research Center.

ELECTROLYTIC REDUCTION OF CHROMIUM (6) AND COPPER USING COKE ELECTRODES

H. O. McDonald, D. M. Soboroff, and A. A. Cochran 1980 14 p refs

(PB81-148249; BM-RI-8472) Avail: NTIS HC A02/MF A01 CSCL 11F

Solutions containing Cr(6+) and sulfuric acid are used in a number of surface finishing operations. Substantial quantities of chromium and copper are lost and pollution problems are created when the spent solutions are discarded. To minimize the undesirable environmental effects while improving secondary resource recovery technology, the Bureau of Mines is conducting research to detoxity and recover metals from these solutions. Spent etchants are treated to remove copper and reduce Cr(6+) to Cr(3+) in an electrolytic cell. GRA

N81-23264# Bureau of Mines, Avondale, Md.

EXPERIMENTAL PROCESSING OF SALT SLAGS FROM AN ALUMINUM DROSS FURNACE

Michael J. Magyar, Robert S. Kaplan, and Harry V. Makar 1980 33 p refs

(PB81-135022; BM-RI-8446) Avail: NTIS HC A03/MF A01 CSCL 11F

The Federal Bureau of Mines has developed a hydrometallurgical method to recover aluminum, aluminum oxide, and fluxing salts from aluminum salt slags. The slag is leached with water at room temperature to produce a saturated brine slurry. Screening of the slurry yields an aluminum-rich fraction that can be returned to the dross furnace. The remaining slurry is vacuum filtered, yielding a clear brine solution and an aluminum oxide filter cake. Evaporation of the clear filtrate produces a high purity fluxing salt for reuse in the dross furnace. GRA

N81-23265# Bureau of Mines, Avondale, Md.

ATMOSPHERIC CORROSION RESISTANCE OF STEELS PREPARED FROM THE MAGNETIC FRACTION OF URBAN REFUSE

Stephen D. Cramer, John P. Carter, and Bernard S. Covino, Jr. 1980 39 p refs

(PB81-148215; BM-RI-8447) Avail: NTIS HC A03/MF A01 CSCL 11F

A study was conducted in which the magnetic fraction of urban refuse was used as melting stock in the preparation of high strength, low alloy, and carbon steel. Product steels, made from incinerated steel can scrap, nonincinerated-detinned steel can scrap, and dilutions of these scraps with No. 1 heavy melting scrap, were used in continuing tests in industrial rural, and marine environments to determine the effect of residual elements and atmospheric pollutants on their atmospheric corrosion resistance. GRA

N81-23266# Bureau of Mines, Pittsburgh, Pa. Pittsburgh Research Center.

ELECTROCHEMICAL CORROSION BEHAVIOR OF ALLOYS FORMED BY ION IMPLANTATION

B. S. Covino, Jr. (Bureau of Mines, Avondale, Md.), B. D. Sartwell (Bureau of Mines, Avondale, Md.), G. R. Conner (Inficon Leybold-Hereus, Syracuse, N. Y.), and P. B. Needham, Jr. (Bureau of Mines, Avondale, Md.) 1980 25 p refs

(PB81-135006; BM-RI-8431; LC-79-607790) Avail: NTIS HC A02/MF A01 CSCL 11F

Research is described for devising substitute corrosion-resistant materials by using ion implantation to form alloyed regions near the surfaces of metals. These alloys were prepared by implanting 25 kev Cr(+) and/or Ni(+) ions into iron. GRA

N81-23267# Bureau of Mines, Twin Cities, Minn.

UTILIZING THE MAGNETIC FRACTION OF RAW REFUSE WITH SHREDDED AUTOMOBILE SCRAP IN CUPOLA GRAY IRON

V. R. Spironello and W. M. Mahan 1980 24 p refs

(PB81-150161; BM-RI-8454) Avail: NTIS HC A02/MF A01 CSCL 11F

Cupola trials were using combinations of refuse scrap with shredded automobile scrap under basic and acid slag practices. Furnace operating information and the behavior of alloying and tramp elements were obtained. The research showed that it is possible to utilize up to 60 percent refuse scrap in the cupola under basic practice and 30 percent under acid practice. GRA

N81-23268# Bureau of Mines, Albany, Oreg. Albany Research Center.

IRON-BASE ALLOYS STRENGTHENED BY LAVES PHASES AS SUBSTITUTES FOR STAINLESS STEELS

J. S. Dunning, M. L. Gleen, and W. L. OBrien 1980 30 p refs

(PB81-150153; BM-RI-8470) Avail: NTIS HC A03/MF A01 CSCL 11F

Precipitation-hardening, iron-base alloys containing molybdenum and titanium were studied as substitutes for the high-tonnage stainless steels that are high in imported nickel and chromium. The precipitation-hardened iron-base alloys are strengthened by a dispersion of the ternary Laves phase, Fe2 (Mo, Ti). Aluminum and chromium additions changed the solid solubility limits of molybdenum and titanium in alpha-iron and affected the composition of precipatating phases. A baseline composition of Fe-7Mo-2Ti was selected to study the effects of aluminum and chromium additions on the precipitation hardening mechanism and microstructure and was also used in studies of mechanical properties and oxidation resistance. GRA

N81-23269# Bureau of Mines, Albany, Oreg. Albany Research Center.

SILVER RECOVERY FROM AIRCRAFT SCRAP

D. Harry Chambers and B. W. Dunning, Jr. 1980 29 p refs

(PB81-150021; BM-RI-8477) Avail: NTIS HC A03/MF A01 CSCL 11F

Silver was recovered by an electrolytic method from stainless steel honeycomb sections separated from aircraft scrap. These sections had been constructed by sandwiching a stainless steel honeycomb core between stainless steel sheets and then brazing the assembly with a silver alloy. Over 300 pounds of silver was used in the B-58 bomber, concentrated in certain honeycomb sections of the aircraft. Following shredding of the aircraft parts, an average of 95 percent (ranging 67 to 100 percent) of the silver was recovered in a single electrorefining step. After the electrorefined product was magnetically cleaned, purity of the recovered silver was greater than 99.3 percent. GRA

N81-23270# Bureau of Mines, Avondale, Md.

CHARACTERIZATION OF ALLOYS FORMED BY ION IMPLANTATION

B. D. Sartwell, A. B. Campbell, III, B. S. Covino, Jr., and P. B. Needham, Jr. 1980 36 p refs

(PB81-148223; BM-RI-8434) Avail: NTIS HC A03/MF A01 CSCL 11F

The formation of alloyed regions near the surface of metals using ion implantation is being investigated as a means of providing corrosion resistance using much smaller amounts of the strategic alloying metals. Two ion implantation systems that can implant low energy chromium, nickel or aluminum ions into low cost substrate materials such as iron or carbon steel were designed and constructed. The developments of the ion source, ion beam acceleration stage, mass analysis system, and target chamber are described in detail. The ion implanted alloys were characterized using proton induced X-ray emission to give the total number of atoms implanted and to determine the extent of any surface contamination introduced by the ion implantation process. GRA

N81-23271# Bureau of Mines, Avondale, Md.

ELECTROCHEMICAL CORROSION OF IRON-CHROMIUM ALLOYS UNDER ULTRA-HIGH-PURITY CONDITIONS

Murray Rosen 1980 74 p refs

(PB81-147134; BM-RI-8425) Avail: NTIS HC A04/MF A01 CSCL 11F

Contrary to data in the literature, Fe-18Cr does not spontaneously corrode in 1N H_2SO_4 solutions of ultra-high-purity; instead, it forms a state that is dependent on the deaerating gas. In He-saturated solution the behavior is one of long-term inactivity at potentials that are usually associated with passivity. In H_2-saturated solution a steady-state, open-circuit potential is spontaneously formed that is within -1 mv of the reversible hydrogen electrode potential for that solution. This noncorroding state in H_2-saturated solution is termed stability In situ

electrochemical measurements of the Fe-18Cr solution interface indicated that stability was dependent not on the presence of surface metal-oxygen species, but on the absence of corrosion-inducing species. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N81-23272 Missouri Univ. -Rolla.
THERMALLY STIMULATED CURRENTS IN GLASSES Ph.D. Thesis
Anil Kumar Agarwal 1980 116 p
Avail: Univ. Microfilms Order No. 8108115

Alkali ion motion was investigated using the thermal stimulated polarization (TSPC) and depolarization (TSDC) current technique in various single alkali silicate, mixed alkali silicate, and high water content alkali silicate glasses. This technique is also applied to anion conducting lead silicate glasses containing Cl(-)anions. Both single and mixed alkali glasses show two TSDC peaks along with a d.c. conduction current at high temperatures. The magnitude of the first TSDC peak is independent of the type of alkali ion or alkali mixing, but does depend upon the water content. The magnitude of the second TSDC peak depends upon the type of alkali ions present and becomes considerably smaller with the addition of second alkali or water to single alkali glasses. A model is proposed to account for the TSDC peaks. The first TSDC peak is attributed to the localized motion of alkali ions situated in stable and interstitial sites around nonbridging oxygen ions. The second TSDC peak is attributed to alkali motion through limited conduction pathways present in these glasses. Dissert. Abstr.

N81-23273 Missouri Univ. -Rolla.
THERMALLY STIMULATED POLARIZATION AND DEPOLARIZATION CURRENT (TSPC/TSDC) IN GLASS Ph.D. Thesis
Chi-Ming Hong 1980 141 p
Avail: Univ. Microfilms Order No. 8108119

The feasibility of studying ionic motion in glass using thermally stimulated polarization (TSPC)/depolarization current (TSDC) techniques was investigated with 4Na2O-96SiO2 and 30PbO-70SiO2 (mol%) glasses. The TSDC peaks in these glasses were dependent on glass composition and attributed to bulk polarization. The high temperature background TSPC is shown to be due to dc conductivity, whereas the TSPC/TSDC peaks in the 4Na2O glass are attributed to shorter range Na(+) motion. (TSPC/TSDC) technique was employed to study Na(-) ion motion in four sodium borate glasses (4 to 16 mol% Na2O) over the temperature range 100 to 500 K. The TSDC peak observed in each glass is tentatively attributed to interfacial polarization at the boundaries of immiscible phases. Dissert. Abstr.

N81-23274 Pennsylvania Univ., Philadelphia.
SYNTHESIS AND PROPERTIES OF HIGHLY CONDUCTING DERIVATIVES OF POLYACETYLENE, POLYPARAPHENYLENEAND GRAPHITE Ph.D. Thesis
Adam B. Pron 1980 266 p
Avail: Univ. Microfilms Order No. 8107787

Selected chemical and physical properties of a quasi one dimensional, organic polymer, polyacetylene, (CH)x, which can be readily doped through the semiconducting to the metallic regime to form a series of organic metals are investigated. In an analogous manner certain highly conducting derivatives of polyparaphenylene, (C6H4)x, and graphite are studied. Selected properties of halogen-doped (CH)x; the nature of the interaction of AsF5 with (CH)x; the interaction of nitronium and nitrosonium salts with (CH)x, (C6H4)x, and graphite; and selected properties of Na-doped (CH)x are all examined. Dissert. Abstr.

N81-23275*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRIBOLOGICAL PROPERTIES AND THERMAL STABILITY OF VARIOUS TYPES OF POLYIMIDE FILMS
Robert L. Fusaro 1981 23 p refs Proposed for Presentation at Joint Lubrication Conf., New Orleans, 4-7 Oct. 1981; sponsored by Am. Soc. of Lubrication Engr.
(NASA-TM-81765; E-710) Avail: NTIS HC A02/MF A01 CSCL 07C

Thermal exposure experiments at 315 and 350 C were conducted on seven different types of polyimide films to determine which was the most thermally stable and adherent. The polyimides were ranked according to the rate at which they lost weight and how well they adhere to the metallic substrate. Friction and wear experiments were conducted at 25 C (room temperature) on films bonded to 440C HT stainless steel. Friction, film wear rates, wear mechanisms, and transfer films of the seven films were investigated and compared. The polyimides were found to fall into two groups as far as friction and wear properties were concerned. Group one had lower friction but an order of magnitude higher film wear rate than did group two. The wear mechanism was predominately adhesive, but the size of the wear particles were larger for group one polyimides. Author

N81-23276# Pennsylvania Univ., Philadelphia. Lab. for Research on the Structure of Matter.
THE BONDING OF H TO NI, PD AND PT SURFACES Interim Report
W. Eberhardt, F. Greuter, and E. W. Plummer 20 Mar. 1981 15 p refs Submitted for Publication
(Contract N00014-79-C-0991)
(AD-A097361; TR-4) Avail: NTIS HC A02/MF A01 CSCL 07/4

The bonding of H to the (111) surfaces of Ni, Pd, and Pt has been studied using angle resolved photoelectron spectroscopy. H adsorbed onto a cooled substrate produces photoemission spectra characteristic of chemisorption. In this state the H atoms form an ordered overlayer. Heating the chemisorbed layer to approx. 300K results in an irreversible transition of the H atoms into a surface site. Author (GRA)

N81-23277# Arizona Univ., Tucson. Dept. of Chemistry.
IN-PLACE POLYMERIZATIONS OF ELECTROPHILIC OLEFINS Final Report, Sep. 1977 - Dec. 1980
H. K. Hall, Jr. 10 Mar. 1981 14 p refs
(Contract DAAG29-77-G-0231)
(AD-A097453; ARO-15287.6-C) Avail: NTIS HC A02/MF A01 CSCL 11/9

This report contains the following: (1) Alpha-Carbomethoxymaleic anhydride, a highly reactive new monomer was synthesized. It oligomerized, copolymerized and cycloadded to electrorich monomers. (2) Dimethyl and diethyl dicyanofumarate, tetrasubstituted olefins, copolymerize with p-methoxystyrene. (3) New 7,7,8,8-tetrasubstituted quinodimethanes containing cyano and ester groups were synthesized and isolated. The homo- and copolymerized and formed charge transfer complexes with tetrathiofulvalene. (4) 3-Methylenecyclobutene-1-carbonitrile, a new monomer was synthesized and polymerized. (5) 1,3-Dicyano and 1,3-dicarbomethoxybutadienes, highly reactive new monomers, were synthesized. They were exceptionally reactive new monomers. (6) NMR study of poly-bicyclobutane-1-carbontrile was done. (7) Three new theories, involving cation-radical or anion-radical propagation and an Organic Chemist's Periodic Table, were proposed. Author (GRA)

N81-23278# SRI International Corp., Menlo Park, Calif.
RESPONSE OF A PLAIN AND FILLED ELASTOMER (SOLITHANE 113) TO HIGH STRAIN-RATE COMPRESSION, SHEAR, AND TENSION LOADING Technical Report, Apr. 1979 - Oct. 1980
Y. M. Gupta and W. J. Murri Jan. 1981 78 p refs
(Contract N00014-78-C-0549; SRI Proj. PYU-7802)
(AD-A097455) Avail: NTIS HC A05/MF A01 CSCL 11/9

To quantify the high strain-rate mechanical response of plain Solithane, compression, shear, and tension experiments were performed under impact loading (microsecond time scales). Compression and tension measurements were carried out for filled Solithane containing 56.5 wt% of glass beads. The results show that the compression response (uniaxial strain) of plain Solithane is dominated by the mean stress-volume relation. The bulk modulus under impact loading is considerably higher than that determined from static measurements in the glassy state.

The filled Solithane compression response can be approximated by a simple mixture theory using the Hugoniots of plain Solithane and glass. GRA

N81-23279# Army Inst. of Dental Research, Washington, D. C.
THE EFFECT OF COOLING RATE ON THE APPARENT BOND STRENGTH OF PORCELAIN-METAL COUPLES
John W. Guinn, III, William H. Griswold, and Stanley G. Vermilyea 6 Mar. 1981 13 p refs Submitted for publication
(AD-A097492) Avail: NTIS HC A02/MF A01 CSCL 11/2

The effects of cooling conditions on the apparent bond strength of a dental porcelain fused to a cast substructure were studied. Under the conditions of this investigation, slow cooling of the porcelain-metal composite in an oven or rapid cooling in an ice chest from the maturation temperature of the porcelain resulted in the highest values of apparent bond strength. However, additional factors must be considered in the selection of a particular cooling method. From the present data, it would appear that cooling of a ceramo-metal restoration under a protective cover would provide the least risk to the integrity of the porcelain-alloy bond and to the surface of the porcelain. Author (GRA)

N81-23280# Naval Research Lab., Washington, D. C. Environmental Biology Branch.
SLIME ANALYSIS OF PAINTED STEEL PANELS IMMERSED IN BISCAYNE BAY, MIAMI BEACH, FLORIDA Final Report, Dec. 1978 - Aug. 1980
George I. Loeb and N. Smith 30 Mar. 1981 33 p refs
(AD-A097229; NRL-MR-4411) Avail: NTIS HC A03/MF A01 CSCL 13/10

Light section microscopy was used to assess slime film formation on panels subjected to both static and dynamic exposure at a Biscayne Bay, Miami site. Both Navy and commercial coatings were used. Slime film thickness was measured and reported for exposures between December 1978 and August 1980. Several coatings seem promising in terms of repression of slimes. The feasibility of the light section technique for assessment of surface roughness of immersed materials is indicated. Author (GRA)

N81-23281# Akron Univ., Ohio. Inst. of Polymer Science.
THE ROLE OF CHEMICAL BONDING IN ADHESION Annual Technical Report
A. N. Gent and P. Dreyfuss Mar. 1981 17 p
(Contract N00014-76-C-0408; NR Proj. 092-555)
(AD-A097388; ATR-5) Avail: NTIS HC A02/MF A01 CSCL 11/9

Progress in three different phases of our study of the role of chemical bonding in adhesion is summarized in this report. Phase one consisted of physical properties of model filled elastomers consisting of polybutadiene with glass beads incorporated. A series of glass beads of different sizes and with different surface treatments were used. The results were compared with those for other systems taken from the literature and with theoretical predictions. Phase two consisted of a study of the adhesion between two similar or dissimilar elastomer layers, differing either in initial degree of crosslinking or in chemical reactivity. Phase three consisted of a study of the role of amines in the adhesion of cured polybutadiene to substrates.
Author (GRA)

N81-23282# Akron Univ., Ohio. Inst. of Polymer Science.
THE ROLE OF CHEMICAL BONDING IN THE ADHESION OF ELASTOMERS
A. N. Gent 3 Apr. 1981 35 p refs
(N00014-76-C-0408; NR Proj. 092-555)
(AD-A097223; TR-11) Avail: NTIS HC A03/MF A01 CSCL 11/9

A review is given of several studies of the effect of interfacial bonding upon the mechanical strength of an adhesive joint. In the first, polybutadiene layers were crosslinked by a free radical process whilst in contact with silane-treated glass. A direct proportionality was found between the minimum peel strength of the joint, as high temperatures and low rates of peeling, and the vinyl content of the silane treatment liquid. Covalent bonding between the diene polymer and vinyl groups on the treated glass was inferred. When radioactivity tagged silanes were employed, extensive combination with the glass substrates was demonstrated. Again, the greater the amount of vinyl silane found on the treated glass surface, the greater the mechanical strength of adhesion between the treated glass and a polybutadiene overlayer. In another series of experiments two partially-crosslinked sheets of polybutadiene were pressed together before the crosslinking was taken to completion. The additional crosslinking was determined from measurements of the elastic properties and of the degree of equilibrium swelling by a compatible liquid. Again, the mechanical strength of adhesion between the two sheets under threshold conditions was found to be directly proportional to the inferred degree of interfacial interlinking.GRA

N81-23283# Akron Univ., Ohio. Inst. of Polymer Science.
THRESHOLD TEAR STRENGTH OF SOME MOLECULAR NETWORKS
A. N. Gent and R. H. Tobias 3 Apr. 1981 21 p refs
(Contract N00014-76-C-0408; NR Proj. 092-555)
(AD-A097232; TR-12) Avail: NTIS HC A02/MF A01 CSCL 11/9

The tear strength of polydimethylsiloxane (PDMS) networks was found to be only about one-third as large as that of polybutadiene (PB) or polyisoprene (PI) networks of similar M sub c when the tear strength was measured under threshold conditions, i.e., at high temperatures, low rates of tearing, and with swollen samples. This striking difference in strength is attributed to the smaller length and extensibility of PDMS molecules in comparison with PB or PI molecules of the same molecular weight. Networks formed by trifunctional or tetrafunctional endlinking reactions with difunctional PDMS polymers were found to be only slightly stronger under threshold conditions, by up to 30 per cent, than PDMS networks formed by random crosslinking to the same M sub c. Endlinked PB networks were found to have substantially the same threshold strength as randomly-linked PB networks of the same M sub c. Thus, the threshold tear strength does not appear to depend strongly upon the uniformity of network strand lengths. Author (GRA)

N81-23284# Cincinnati Univ., Ohio. Dept. of Chemistry.
INTRAMOLECULAR FLEXIBILITY OF RELATIVELY RIGID POLYMERS, AND INTERMOLECULAR INTERACTIONS IN ORDERED POLYMER SYSTEMS, PART 2 Annual Report, 1 Oct. 1979 - 30 Sep. 1980
D. Bhaumik, W. J. Welsh, and J. E. Mark 26 Jan. 1981 15 p refs
(Grant AF-AFOSR-3683-78; AF Proj. 2303)
(AD-A097424; AFOSR-81-0364TR-Pt-2; AR-2) Avail: NTIS HC A02/MF A01 CSCL 11/9

Conformational energy calculations were carried out on benzoxazole and benzothiazole polymers in order to determine whether or not the molecules are planar and if not, the extent of their nonplanarity. Such information is highly relevant to the nature of the chain packing in the crystalline and liquid-crystalline states. Intermolecular interactions were also investigated, both with regard to their effect on the extent to which the chains approach the desired coplanar conformations, and with regard to the origin of the high mechanical strengths of these materials and their resistance to almost all common solvents. The polarizabilities of these molecules were also estimated using a variety of theoretical methods; this information should be very useful in the interpretation of solution property studies, such as flow birefringence measurements used to obtain rheological information relevant to the processing of these materials. A series of wholly aromatic heterocyclic swivels were also characterized with regard to their flexibilities in both the unprotonated state and in protonated state present in the strongly acidic media used as solvents for these polymers. Author (GRA)

N81-23285# Illinois Univ. at Urbana. School of Chemical Sciences.
AN INVESTIGATION OF UNIQUE METAL COMPLEXES PRODUCED USING POLYSTYRENE 2,2 PRIME-BIPYRIDINE AS A SUPPORT, AND SEVERAL HYDROGENATION CATALYSTS DERIVED FROM THIS COPOLYMER
Russell S. Drago, Eric D. Nyberg, and A. G. ElAmma 16 Mar. 1981 29 p refs
(Contract N00014-78-C-0245)
(AD-A097174; ONR-TR-5) Avail: NTIS HC A03/MF A01 CSCL 11/9

The cleavage reaction between polystyrene bound pyridine and 2,2:-bipyridine ligands, p-py and p-bipy, and the dimers (Rh(X)(CO)C1)2 (X=CO, (C6H5)3P, or toly13P) were studied. While the p-py cleavages produced products analogous to those found homogeneously, the reactions using p-bipy resulted in the formation of several metal complexes not found in solution. This is at least in part the result of the accessability of the initially formed p-bipy-rhodium complexes to subsequent reactions which cannot occur in the homogeneous case due to precipitation of the rhodium complex initially formed. GRA

N81-23286# Texas A&M Univ., College Station. Dept. of Chemistry.

NEW TYPE OF METALLO-ORGANIC POLYMER: BIMETAL-LOPORPHYRINS. INVESTIGATING A NEW CHEMISTRY OF METALLOPHTHALOCYANINES Final Report, Apr. 1973 - Dec. 1980

Minoru Tsutsui Jan. 1981 16 p refs
(Contract N00014-75-C-0417; NR Proj. 053-559)
(AD-A097447) Avail: NTIS HC A02/MF A01 CSCL 11/9

The creations (synthesis) of out of plane and skewered metalloporphyrins were reported. The structure of bis (phthalocyaninato)neodymium(III) was elucidated by the X-ray diffraction analysis. From the conductivity of (Pc2Nd)(-)H(+), a new hydrogen bonded polymer structure in crystal solid state without solvent was proposed. GRA

N81-23287# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.

HOMOGENEOUS AND HETEROGENEOUS RUBBERY/RUBBERY DIBLOCK COPOLYMERS AND POLYMER BLENDS - A UNIFIED VIEW

Robert E. Cohen 15 Apr. 1981 23 p refs To be presented at the ACS Symp. on Elastomers and Rubber Elasticity, Aug. 1981
(Contract N00014-77-C-0311; NR Proj. 356646)
(AD-A097690; TR-8) Avail: NTIS HC A02/MF A01 CSCL 11/9

A large amount of data obtained in previous work is brought together to present a unified picture of the homogeneous/heterogeneous behavior of various two-component polymer systems. The materials under discussion are comprised of various proportions of a rubbery/rubbery diblock copolymer and each of the corresponding rubbery homopolymers. Author (GRA)

N81-23288# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

DEVELOPMENT OF A WATER DISPLACING, TOUCH-UP PAINT Final Report

Charles R. Hegedus 24 Feb. 1981 30 p refs
(WF61562001)
(AD-A097125; NADC-80207-60) Avail: NTIS HC A03/MF A01 CSCL 11/3

A water displacing paint has been developed for touch-up of existing paint which has cracked or chipped. Laboratory results illustrate that this coating has good adhesion, flexibility, and chemical, heat and weather resistance. The coating will displace water from a substrate upon application and will subsequently afford corrosion protection to the underlying metal. The developed coating can be applied by aerosol, conventional or airless spray techniques. GRA

N81-23289# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

TEST METHODS AND RESULTS OF A STUDY OF GREASES FOR USE IN ROTO-LAUNCH VALVE LUBRICATION Status Report

Paul Kennedy and Leon Stallings 11 Feb. 1981 15 p ref
(AD-A097565; NADC-81014-60) Avail: NTIS HC A02/MF A01 CSCL 11/8

The extended use of a MIL-G-23549 grease for lubrication of a roto-launch valve maintained at a temperature of 700 F caused a significant lubrication problem. This was brought about by decomposition of the grease into a solid mixture of molybdenum disulfide and clay which would clog grease lines in the vicinity of the valve. As an approach to this problem, several alternate grease formulations capable of providing lubrication under high load conditions were evaluated for their tendency to decompose at high temperatures. Testing was done by measuring the adhesion of grease residues to a steel surface and by measuring the amount of pressure required to force grease through a test rig maintained at 700 F. These studies indicated that the use of alkly-urea thickeners in place of clay thickeners decreases the tendency of a grease to clog grease lines under high temperature conditions. Author (GRA)

N81-23290# Massachusetts Univ., Amherst. Dept. of Chemical Engineering.

LIQUID CRYSTAL POLYMERS: THERMOTROPIC RIGID AROMATIC COPOLYESTERS WITH BISPHENOL SPACERS

Robert W. Lenz and J. I. Jin 9 Mar. 1981 30 p refs Submitted for publication
(Contract N00014-76-C-0700)
(AD-A097667; ONR-TR-7) Avail: NTIS HC A03/MF A01 CSCL 11/9

A series of aromatic polyesters based on either poly(chloro-p-phenylene terephthalate) or poly(methyl-p-phenylene terephthalate) modified by incorporation of various amounts of bisphenols of different structures were prepared and their thermotropic liquid crystal properties were studied by several methods including: (1) visual observation of stir-opalescence of the polymer melts, (2) examination of melt birefringence on a polarizing microscope, (3) studies of small angle light scattering characteristics, and (4) characterization by wide angle X-ray diffraction. It was found that the steric effects on non-linear bisphenol modifiers were the most important factors in controlling the liquid crystallinity of the resulting copolyesters. GRA

N81-23291# California State Univ., Sacramento. Dept. of Chemistry.

SYNTHESIS OF HYDROXY-TERMINATED DINITROPROPYL ACRYLATE POLYMERS Interim Report, 1 Jan. 1979 - 30 Sep. 1980

C. S. Kim Jan. 1981 60 p refs
(Contract F04611-79-C-0009)
(AD-A097577; AFRPL-TR-81-11) Avail: NTIS HC A04/MF A01 CSCL 11/9

Studies of free-radical polymerization kinetics using new initiators and chain transfer agents were done with the objective of achieving the synthesis of difunctional hydroxy-terminated dinitropropyl acrylate polymers. The functionality of the DNPA polymers was increased from 1.6 to 1.8. An infrared method was used to determine OH-equivalent weights. The methods and results are described. Author (GRA)

N81-23292# Argonne National Lab., Ill.

DEVELOPMENT OF NONDESTRUCTIVE EVALUATION TECHNIQUES FOR HIGH-TEMPERATURE CERAMIC HEAT EXCHANGER COMPONENTS Annual Report, Oct. 1979 - Sep. 1980

D. S. Kupperman, D. Yuhas (Sonoscan, Inc., Bensenville, Ill.), C. Sciammarella (Illinois Inst. of Technology, Chicago), M. J. Caines, and A. Winiecki Dec. 1980 88 p refs
(Contract W-31-109-eng-38)
(ANL-80-123; AR-3) Avail: NTIS HC A05/MF A01

Objectives were to: (1) develop a computer interfaced ultrasonic bore-side probe for preservice and in-service inspection: (2) develop and assess techniques for inspection of SiC tubing by acoustic microscopy; and (3) carry out preliminary tests to compare ultrasonic, holographic, and infrared techniques with more conventional dye-penetrant and radiographic methods for inspection of butt joints in ceramic tubes. Circumferential notches, 125 (SIGMA) m deep x 250 (SIGMA) m long, on the inner and outer surfaces of sintered and siliconized SiC tubes were detected with an ultrasonic bore-side probe. The acoustic microscope was modified to handle 30 as well as 100 MHz sound waves, since the lower frequency waves give better penetration of SiC tube walls. The modification decreased the acoustic noise. DOE

N81-23293# Purdue Univ., Lafayette, Ind.

EFFECTS OF INTERNAL GAS PRESSURE AND MICRO-STRUCTURE ON THE MECHANISMS OF HOT PRESSING AND SWELLING IN CERAMICS Final Report, 1 Jun. 1979 - 31 May 1980

A. A. Solomon Aug. 1980 12 p

(COO-2713-5) Avail: NTIS HC A02/MF A01

The results of the study of the effects of internal and external gas pressures on ceramics are summarized. The experimental systems for studying these phenomena are described. The study has shown that the rate of volume change in ZnO is linearly related to the total pressure driving force. Swelling and hot pressing can be described on a consistent basis in terms of this driving force. For ZnO, Ni, and UO2 the rate of volume change is dependent on bulk diffusion. The porosity evolution during swelling is described and the resintering phenomenon is identified. Various models for pore growth and shrinkage are considered and related to the behavior of the different systems. DOE

N81-23294# Minnesota Univ., Minneapolis.
CORROSION RESEARCH CENTER OF THE UNIVERSITY OF MINNESOTA Progress Report, 1 Jul. - 31 Dec. 1980
R. A. Oriani 30 Jan. 1981 178 p refs
(Contract DE-AC02-79ER-10450)
(DOE/ER-10450/1) Avail: NTIS HC A08/MF A01

At present, the research ranges from the quantum mechanics of the corrosion unit reactions, organic and inorganic coatings, surface reactions on polymers, metals and semiconductors to high temperature chemistry of interest to solar energy conversion. A second objective of the Center is to increase the utilization of corrosion data by the technical community through education and through the dessemination of appropriately formatted information. At present, two projects are in the planning stage for the near future. One is a pedagogical symposium on corrosion in microelectronic components and systems; the other is a series of lectures and videotapes, as well as a workshop on cathodic protection. DOE

N81-23295# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
HIGH-TEMPERATURE PROPERTIES AND PROCESSES IN CERAMICS: THERMOMIGRATION Annual Report, 1 Jan. - 31 Dec. 1980
Bernhardt J. Wuensch 1980 20 p refs
(Contract DE-AS02-76ER-02923)
(DOE/ER-02923/4) Avail: NTIS HC A02/MF A01

Information is presented concerning pore migration in KCl crystals in a temperature gradient, thermomigration of electronic defects and vacancies in FeO, time dependent thermomigration, and influence of transmutation on radiotracer diffusion. A study of local electrochemical equilibrium and a discussion of short circuit diffusion paths are included. DOE

N81-23296# General Electric Co., St. Petersburg, Fla. Corporate Research and Development Dept.
STUDY OF LOCAL ATOMIC AND ELECTRONIC STRUCTURE IN GLASSY METALLIC ALLOYS Progress Report, 1 Dec. 1979 - 1 Nov. 1980
R. P. Messmer and J. Wong 1980 18 p refs
(Contract DE-AC02-79ER-10382)
(DOE/ER-10382/2) Avail: NTIS HC A02/MF A01

The effect of P and B on the magnetic moment of the clusters was investigated and found to parallel the known experimental trend. Significant metal-rnetalloid bonding was found in all the clusters studied. A detailed analysis of the bonding in these small clusters was carried out. As a result of this detailed analysis a significant conclusion was reached: there are preferential metal-metalloid interactions which are predicted on the basis of the calculations. Room temperature extended X-ray absorption fine structure spectra above the K absorption edge of metal constituents in the following metal-metalloid and metal-metal glasses were measured: Fe/sub 1-x/B/sub x/, (FeNi)/sub 1-x/B/sub x/, Ni/sub 1-x/B/sub x/; Zr/sub 1-x/M/sub x/ (M-Fe, Co, Ni and Cu) and Nb/sub 1-x/Ni/sub x/. DOE

N81-23297# Sandia Labs., Albuquerque, N. Mex.
GLASS CERAMICS FOR SEALING TO HIGH-THERMAL-EXPANSION METALS
J. A. Wilder, Jr. Oct. 1980 26 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-2192) Avail: NTIS HC A03/MF A01

Glass ceramics were studied to establish their suitability for sealing to high thermal expansion metals, e.g., aluminum, copper, and 300 series stainless steels. Glass ceramics in Na2O.CaO.P2O5 and Na2O.BaO.P2O5 systems have suitable coefficients of thermal expansion and fracture toughness values generally greater than those of phosphate glasses; they are suitable for fabricating seals to high thermal expansion metals. Crystal phases include NaPo3, (NaP03)3, NaBa(P03)3, and NaCa(P03)3. Due to their low thermal expansion values, glass ceramics in the Li2O.BaO.P2O5 system are unsuitable for sealing to high thermal expansion metals. L.F.M.

N81-23298# California Univ., Livermore. Lawrence Livermore Lab.
EFFECT OF VINYL AND PHENYL CONTENTS OF SILICONE GUM ON THE PROPERTIES OF THE ELASTOMERS AND CELLULAR SILICONE CUSHIONS
W. E. Cady, E. S. Jessup, and A. T. Buckner 2 Dec. 1980 19 p refs
(Contract W-7405-eng-48)
(UCRL-53105) Avail: NTIS HC A02/MF A01

Two series of random terpolymers of dimethyl-diphenyl-methylvinylsiloxane were synthesized. In one series, the amount of methylvinylsiloxane was varied from 0 to 5 wt % and diphenylsiloxane was maintained at a nominal 12 wt %. In the other series, diphenylsiloxane was varied from 0 to 18 wt % and methylvinylsiloxane was maintained at a nominal 1 wt %. Molecular weights were maintained around 500,000. These gums were filled with about 26 wt % silicon dioxide and then converted to the intermediate elastomers, temporarily filled molding compounds, and cellular silicone cushions. The intermediate elastomers and cellular silicones were cured with a vinyl specific catalyst and tested. Increasing vinyl content increases the stiffness of the cushion but decreases its resiliency. Compression set reaches a minimum of about 5% at a methylvinylsiloxane content of about 0.9 wt %. Phenyl content has only a slight effect on cushion properties. Compression set is a minimum in a range of 7 to 14 wt % diphenylsiloxane. DOE

N81-23299# Bureau of Mines, Twin Cities, Minn.
HIGH-TEMPERATURE CORROSION RESISTANCE OF ALUMINA REFRACTORIES TO LIGNITE ASH SLAGS
J. E. Pahlman, C. F. Anderson, and S. E. Khalafalla 1980 28 p refs
(PB81-148272; BM-RI-8430) Avail: NTIS HC A03/MF A01 CSCL 11B

As part of its goal to minimize the requirements for mineral commodities through conservation and substitution, the Bureau of Mines is conducting research to determine the resistance of alumina refractories to corrosion by alkali containing slags that could result from burning of the abundant Western lignites in metallurgical operations. Static corrosion tests were performed at 1,000 to 1,350 C and dynamic tests were performed at 1,400 to 1,600 C to investigate the stability of refractory specimens in slag environments. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N81-23300*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HEAT STERILIZABLE SOLID-PROPELLANT DEVELOPMENT
S. H. Kalfayan 15 Apr. 1981 72 p refs
(Contract NAS7-100)
(NASA-CR-164281; JPL-Pub-81-21) Avail: NTIS HC A04/MF A01 CSCL 21I

The binders tested were polyurethanes made from two hydroxy-terminated polybutadienes, R-45 and Butarez HT, one hydroxy-terminated butadiene-acrylonitrile copolymer, Hycar 1300X 17, and a hydroxy-terminated prepolymer, Esterdiol 560, made from the dimerized fatty acid Empol 1010. The isocyanates used most extensively were isophorone diisocyanate (IPDI) and a polymeric diisocyanate, DDI. Stress relaxation was used to

examine the chemical changes that took place in the binder when subjected to the sterilization temperatures. The thermal stability of the oxidizer, ammonium perchlorate (AP), was tested by thermogravimetry in the isothermal and nonisothermal modes. The effect of particle size, recrystallization, moisture content, and doping on the heat stability of AP could be evaluated by this method. The volatile degradation products, obtained when AP samples were aged at 135 C for prolonged periods, were analyzed by mass spectroscopy. E.D.K.

N81-23301# Materials Research Labs., Ascot Vale (Australia).
DEVELOPMENT OF A GASLESS PYROTECHNIC CAP
John R. Bentley and Paul P. Elischer May 1980 28 p refs
(AD-A097197; MRL-R-776; AR-002-160) Copyright. Avail: NTIS HC A03/MF A01 CSCL 19/1

A new gasless pyrotechnic percussion cap composition was developed and tested in M42 cup assemblies. The sensitivity was comparable to M42 caps and preliminary tests indicated that the stability of the composition was satisfactory. The composition produced minimum gaseous by-products and gave an adequate output to ignite pyrotechnic delay units reliably. The new composition overcomes the problem of cap ejection and venting due to the high pressures produced by traditional percussion cap compositions in hermetically sealed systems. Author (GRA)

N81-23302# Pennsylvania State Univ., University Park.
DYNAMIC BURNING EFFECTS IN THE COMBUSTION OF SOLID PROPELLANTS WITH CRACKS, AND THE USE OF GRANULAR BED COMBUSTION MODELS Final Report, 23 Oct. 1978 - 30 Sep. 1979
Kenneth K. Kuo and Mridul Kumar Dec. 1980 66 p refs
(Contract N60530-79-C-0006)
(AD-A097474; NWC-TP-6193) Avail: NTIS HC A04/MF A01 CSCL 21/9

This report is a facsimile of a report submitted by Systems Associates, Pennsylvania State University, under Contract N60530-79C-0006 and maintains the original format. It includes the study of dynamic burning effects in the combustion of solid propellants with cracks, and the use of granular bed combustion codes for solving hazard problems in rocket propulsion systems. The Zeldovich quasi-steady flame model was used in the evaluation of the dynamic burning effect. The dynamic burning rate was obtained by solving the transient heat conduction equation for the solid propellant and using the Zeldovich map for determining the heat feedback. Results indicate a stronger dynamic burning response for a higher pressurization rate, larger energy storage in the propellant, and lower initial pressure. A dynamic burning-rate augmentation function was developed to facilitate the incorporation of the transient burning effect into the crack combustion code. The augmentation function is in close correlation with results obtained from the finite difference method over the broad range of conditions studied. The mobile and fixed granular bed combustion codes (MGBC and FGBC), users manuals for these two programs, sample input data, and output listing were delivered to NWC. GRA

N81-23303# Computer Sciences Corp., Bay St. Louis, Miss.
TNT EQUIVALENCY OF BULK NITROCELLULOSE Final Report, Aug. - Sep. 1978
F. L. McIntyre, P. Price, and D. Westover Dover, N.J. Army Armament Research and Development Command Mar. 1981 57 p refs
(Contract MIPR-8311-0089)
(AD-A097472; AD-E400576; ARLCD-CR-81007) Avail: NTIS HC A04/MF A01 CSCL 19/1

Peak side-on blast overpressure and scaled positive impulse have been measured for Nitrocellulose MIL-N-244A using configurations that simulate in- plant processing. Quantities of 11.34, 19.5, 22.68, 45 and 63.5 kg were tested in cylindrical storage containers, and orthorhombic scaled weigh feeder tube and a simulated section of the Thermal Dehydration Unit. High explosive equivalency values for each test series were obtained as a function of scaled distance by comparison to known pressure and impulse characteristics for TNT hemispherical surface bursts. GRA

N81-23304# Naval Research Lab., Washington, D. C. Environmental Biology Branch.
MICROBIAL DETERIORATION OF MARINE DIESEL FUEL FROM OIL SHALE Final Report
M. E. May and R. A. Neihof 9 Apr. 1981 17 p refs
(AD-A097674; NRL-MR-4489) HC A02/MF A01 CSCL 06/13

Recurring problems with conventional ship fuels caused by microorganisms have prompted an evaluation of the susceptibility of a recently produced synthetic diesel fuel from oil shale to microbial contamination. The growth of typical microbial contaminants of hydrocarbon fuels has been determined over a four month period in two-phase systems consisting of fresh and sea water media overlaid with fuel. Anaerobic, sulfate-reducing bacteria and a yeast (Candida sp.) grew as well in the synthetic fuel as in fuel derived from petroleum. Growth of certain strains of the fungus, Cladosporium resinae, was initially delayed in the synthetic diesel fuel but after 8-13 weeks the growth was generally comparable to that in petroleum-derived fuel. This finding indicated that C. resinae may require time for adaptation to constituents in the oil shale fuel. Ultimately, however, it appears that the synthetic diesel fuel is likely to be as susceptible to microbial contamination as conventional diesel fuel has been. Experience acquired with available synthetic fuels shows that their ability to support growth of microbial contaminants varies widely depending on both the source of crude oil and the refining processes used. Author (GRA)

N81-23305# Naval Surface Weapons Center, White Oak, Md.
HOT SPOT INITIATION PATTERNS IN SHOCKED EXPLOSIVES AND PROPELLANTS RECORDED BY THERMAL FILM Technical Report, Jan. - Jun. 1979
Thomas P. Liddiard, Michael J. Frankel, and Charles S. Coffey 2 Dec. 1980 31 p refs
(AD-A097088; NSWC/TR-79-281) Avail: NTIS HC A03/MF A01 CSCL 19/1

Recovery of thermally sensitive films from explosives subjected to low level, long duration shocks allows one to obtain in situ records of heating patterns and formation of hot spots. The degree of discoloration in the recovered film corresponds to reaction induced temperatures of the order of several hundred C. Differing patterns of initiation buildup may be observed in different explosive compositions. The film technique is also seen to be a more sensitive detector of low level reactions than the underwater bulk expansion optical method. GRA

N81-23306# Union Oil Co. of California, Brea. Science and Technology Div.
ETHANOL FUEL MODIFICATION FOR HIGHWAY VEHICLE USE Final Report
Jan. 1980 220 p refs
(Contract EY-76-C-04-3683)
(ALO-3683-T1) Avail: NTIS HC A10/MF A01

A number of problems that might occur if ethanol were used as a blending stock or replacement for gasoline in present cars are identified and characterized as to the probability of occurrence. The severity of their consequences is contrasted to those found with methanol in a previous contract study. Possibilities for correcting several problems are reported. Some problems are responsive to fuel modifications but others require or are better dealt with by modification of vehicles and the bulk fuel distribution system. In general, problems with ethanol in blends with gasoline were found to be less severe than those with methanol. Phase separation on exposure to water appears to be the major problem with ethanol/gasoline blends. Another potentially serious problem with blends is the illicit recovery of ethanol for beverage usage, or bootlegging, which might be discouraged by the use of select denaturants. Ethanol blends have a somewhat greater tendency to vapor lock than base gasoline but less than methanol blends. Gasoline engines would require modification to operate on fuels consisting mostly of ethanol. DOE

N81-23307# Southern California Edison Co., Rosemead. Research and Development Sect.
TEST AND EVALUATION OF METHANOL IN A GAS TURBINE SYSTEM Final Report
A. Weir, Jr. Feb. 1981 239 p refs

(EPRI Proj. 988-1)
(EPRI-AP-1712) Avail: NTIS HC A11/MF A01

A test was conducted to compare the operational and emission characteristics of two gas turbines, one operating on distillate fuel (Jet A) and the other operating on methanol. The facility consisted of two gas turbines combined with an electric generator in a TP-4 Twin Pac configuration. During the major portion of the program, no water was injected into the methanol fueled turbine. Periodically, performance and emission tests as well as physical inspections of the hot section of each turbine were conducted. Emission and performance tests were also conducted on natural gas. One series of tests was conducted with distilled water injected into the combustion chamber during methanol operations. Oxide of nitrogen emissions on the methanol fueled turbine, without water injection, were approximately 80 percent of the emissions of the distillate fueled turbine with water injection. There was a significant reduction in particulate emissions during methanol operation. An additional reduction in oxides of nitrogen emission was obtained during operations of the methanol fueled turbine with water injection. DOE

N81-23308# Combustion Engineering, Inc., Windsor, Conn. Power Systems Group.
INDUSTRIAL APPLICATION OF C-ES COAL-GASIFICATION PROCESS Final Report, Jan. 1979 - Aug. 1980
K. Atabay, M. Baldassari, and P. R. Thibeault Jan. 1981 224 p refs
(Contract DE-AC01-76ET-10204)
(FE-1545-86) Avail: NTIS HC A10/MF A01

Plant designs were developed and costs estimated for each of four cases to determine the potential of a clean fuel gas produced from a C-E gasifier as a cost effective substitute for present energy sources or feedstocks. The gasification potential for industry was determined by reviewing the literature for energy demand and how energy is used. It is estimated that the potential for coal gasification in industry is about 5 x 10 to the 15th power Btu per year. This potential represents about 500 gasification plants at an average capacity of 30 x 10 to the 9th power Btu per day. Those industries which were identified as having the largest potential are the petroleum, chemical, steel, and paper industries with a combined estimated potential of 4.5 x 10 to the 15th power Btu/year. Other industries with a sizable potential are the stone, glass, food, and metal mining industries. DOE

N81-23309# TRW, Inc., McLean, Va. Energy Engineering Div.
COALBED METHANE PRODUCTION CASE HISTORIES
Feb. 1981 38 p
(Contract DE-AC21-78MC-08089)
(DOE/METC-08089/115) Avail: NTIS HC A03/MF A01

A brief description of wells that are presently producing gas from coal or coal bearing rocks is given. Data from three gob gas production areas in Illinois, an in-mine horizontal borehole degasification, and eleven vertical boreholes are presented. Production charts and electric logs of the producing zones are included for some of the wells. Additional information on dry gas production from the San Juan Basin, Colorado/New Mexico and the Greater Green River Coal Region, Colorado/Wyoming is also included. DOE

N81-23310# Rockwell International Corp., Canoga Park, Calif. Energy Systems Group.
MOLTEN SALT COAL GASIFICATION PROCESS DEVELOPMENT UNIT, PHASE 2 Quarterly Technical Progress Report, Jul. - Sep. 1980
M. H. Slater 20 Oct. 1980 60 p
(Contract DE-AC03-77ET-10296)
(DOE/ET-10296/70; QTPR-1) Avail: NTIS HC A04/MF A01

The feasibility of the molten salt coal gasification (MSCG) process for producing low Btu gas is demonstrated. A process development unit (PDU) was built for converting 1 ton of coal per hour to a nonpolluting, low Btu fuel (about 150 Btu/scf) at about 1800 F and up to 20 atm pressure. The system was equipped for removing ash, regenerating sodium carbonate, and disposing of sulfur from the coal. R.C.T.

N81-23311# Chevron Research Co., Richmond, Calif.
REFINING AND UPGRADING OF SYNFUELS FROM COAL AND OILSHALES BY ADVANCED CATALYTIC PROCESSES Quarterly Report, Jul. - Sep. 1980
R. F. Sullivan, D. J. Orear, and H. A. Frumkin Oct. 1980 29 p
(Contracts DE-AC22-76ET-10532; EF-76-C-01-2315)
(FE-2315-58) Avail: NTIS HC A03/MF A01

This quarterly report includes design improvements for the refining of SRC-II syncrude, hydrocracking experimental results on Wyodak H-Coal syncrude, and estimates of the potential yield of benzene, toluene, and eliminated from the proposed SRC-II refining scheme. This reduces the investment by $50 MM and reduces the refining cost by $0.50/bbl. The experimental program on H-Coal syncrudes is complete. Updated analyses on the last task in this program, extinction recycle hydrocracking, are included. The potential yield of benzene, toluene, and xylene from Wyodak H-Coal, Illinois H-Coal, and SRC-II syncrudes is nearly 50%. Slight differences between the yield from the three syncrudes can be accounted for by differences in the properties of the syncrudes. DOE

N81-23312# Physical Sciences, Inc., Woburn, Mass.
EFFECTS OF PREIGNITION ON PULVERIZED COAL COMBUSTION Quarterly Report, 19 Sep. - 31 Dec. 1980
Girard A. Simons and G. Kothandaraman Jan. 1981 32 p refs
(Contract DE-AC22-80PC-30293)
(DOE/PC-30293/1) Avail: NTIS HC A03/MF A01

The theoretical task of optimizing pore structure with respect to char reactivity has indicated that the total porosity and the distribution of porosity are the most important char characteristics to consider when trying to optimize char oxidation above 8000K. The bench scale experiment designed to achieve to optimum char structure was designed. DOE

N81-23313# Ames Lab., Iowa. Earth Sciences Dept.
CHANGES OCCURRING IN COAL DURING IN SITU GASIFICATION M.S. Thesis
Gregory L. Thompson Feb. 1981 128 p refs
(Contract W-7405-eng-82)
(IS-T-950) Avail: NTIS HC A07/MF A01

Simulated in situ gasification experiments are discussed which combusted lignite and bituminous coals under nearly identical conditions. Several standard coal and coke analysis technqiues were used to chemically, physically, and petrographically characterize the coal and the residues left after its gasification experiments. Additional comparisons of these residues to carbonized coal were made largely because of their visual similarities. These comparisons provide added insight into the changes the in situ gasification residues undergo. DOE

N81-23314# Institute of Gas Technology, Chicago, Ill.
RESEARCH AND DEVELOPMENT OF RAPID HYDROGENATION FOR COAL CONVERSION TO SYNTHETIC MOTOR FUELS (RISER CRACKING OF COAL) Final Report, 1 Apr. 1976 - 30 Sep. 1980
D. A. Duncan, Justin L. Beeson, and R. Donald Oberle Feb. 1981 208 p refs
(Contracts DE-AC21-76ET-10520; EX-76-C-01-2307)
(DOE/ET-10520/1) Avail: NTIS HC A10/MF A01

The objective of the program described was to develop a noncatalytic process for the hydropyrolysis of lignite and coal to produce high octane blending gasoline constituents, methane, ethane, and carbon oxides. The process would operate in a balanced plant mode, using spent char to generate process hydrogen by steam oxygen gasification. The technical program included the construction and operating of a bench scale unit, the design, construction, and operation of a process development unit (PDU), and a final technical and economic assessment of the process, called Riser Cracking of Coal. In the bench scale unit program, 143 runs were made investigating the effects of pressure, temperature, heating rate, residence time, and particle size, processing North Dakota lignite in hydrogen. Some runs were made in which the hydrogen was preheated to pyrolysis temperatures prior to contact with the coal, and also in which steam was substituted for half of the hydrogen. Depth of carbon conversion was found to be influenced by hydrogen pressure,

hydrogen to coal ratio, and the severity of the thermal treatment. DOE

N81-23315# Institute of Gas Technology, Chicago, Ill.
COAL GASIFICATION PILOT PLANT SUPPORT STUDIES Quarterly Report, 1 Oct. - 31 Dec. 1979
Oct. 1980 134 p
(Contract DE-AC21-78ET-11330)
(FE-2806-7) Avail: NTIS HC A07/MF A01

Coal gasification research programs support gasification pilot plant operations but are not limited to them. As a result programs were developed to also study chemical reactions in gasification, fluidized bed reactors, processing product and waste gases, and improved methods of coal feed preparation. The objectives and technical progress in these areas, and, in some cases, subdivisions of them are presented. DOE

N81-23316# Exxon Research and Engineering Co., Linden, N.J.
FUNDAMENTAL SYNTHETIC FUEL STABILITY STUDY Annual Report, 1 May 1979 - 30 Apr. 1981
J. W. Frankenfeld Feb. 1981 96 p refs
(Contract DE-AC19-79BC-10045)
(DOE/BC-10045/12; AR-1) Avail: NTIS HC A05/MF A01

A variety of organic nitrogen compounds were evaluated for their tendencies to promote sediment in hydrocarbon fuels under accelerated storage conditions. Three diluents were employed: pure n-decane, petroleum derived JP-8, and No. 2 diesel fuel. The fuels and fuel mixtures were stored at 1100 F and 1500 F in the dark. The most deleterious species to fuel stability were found to be alkylated heterocyclic nitrogen compounds. The most reactive compounds were those with two or more alkyl groups, at least one of which was situated on a carbon adjacent to the nitrogen. A highly deleterious compound is 2,5 dimethyl-pyrrole (DMP). Other nitrogen compounds, such as amines, amides and nonalkylated heterocycles were found to interact with deleterious nitrogen compounds to promote sediment formation. With the exception of sulfonic acids, none of the sulfur or oxygen compounds studied produced sediment when tested by themselves. DOE

N81-23317# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
CROSSED REACTION NETWORKS IN THE CATALYTIC HYDRODENITROGENATION OF SYNTHETIC LIQUID FUELS Quarterly Report, 1 Nov. 1980 - 30 Jan. 1981
Charles N. Satterfield and Shan Hsi 1981 17 p
(Contract DE-AC22-80PC-30075)
(DOE/PC-30075/4) Avail: NTIS HC A02/MF A01

The trickle bed reactor system was brought into operation and sample analysis by gas chromatography was refined. Whether or not unsuspected homogeneous reactions may contribute significantly to the reaction network of quinoline under typical HDN conditions was explored. Details are presented on the following: the automatic shut down system, application of a capillary column in the gas chromatographic analysis, absolute response factors obtained for various compounds in gas chromatographic analysis, thermocracking of liquid carrier under HDN conditions, possibility or 1,2,3,4 tetrahydroquinoline or 5,6,7,8 tetrahydroquinoline acting as a homogeneous hydrogen donor or hydrogen acceptor in the quinoline reaction network, and homogeneous reaction of quinoline under HDN conditions. DOE

N81-23318# West Virginia Univ., Morgantown. Dept. of Geology and Geography.
ANALYSIS OF THE STRUCTURAL PARAMETERS THAT INFLUENCE GAS PRODUCTION FROM THE DEVONIAN SHALE, VOLUME 1 Annual Progress Report, 1979 - 1980
J. Negus-DeWys, Jeanette M. Dixon, Mark A. Evans, Kevin D. Lee, James Ruotsala, Thomas H. Wilson, and Richard T. Williams
Oct. 1980 35 p refs
(Contracts DE-AC21-76ET-12138; DE-AC21-76MC-05194)
(DOE/ET-12138/T1-Vol-1) Avail: NTIS HC A03/MF A01

The results and progress of efforts toward understanding shale gas production from the Devonian shale in Appalachia are presented. A correlation was found between the geochemical parameters of the shale in eastern Kentucky and shale gas production there. Tasks on resource inventory tasks and shale characterization include regional structure studies, production studies, geophysical studies, structure studies, fracture density and orientation, and fracture studies. DOE

N81-23319# Department of Energy, Washington, D. C. Assistant Secretary for Fossil Energy.
ANALYSIS OF THE MARKET AND PRODUCT COSTS FOR COAL-DERIVED HIGH BTU GAS: STAFF WORKING PAPER
Dec. 1980 54 p
(DOE/FE-0011) Avail: NTIS HC A04/MF A01

This analysis is based upon supply and demand projections that reflect the effects of natural gas deregulation, recent large oil price increases, and new or pending legislation designed to reduce oil imports. Product economics are based upon estimates developed by the staff of the Office of Plans and Technology Assessment using internal DOE studies and published data. While these data are believed to be representative of the costs to produce high Btu gas from coal using advanced gasification technology that is ready for technical demonstration at commercially relevant scales, they are not based upon detailed design studies. The analysis indicates that an increasingly large market for supplemental gas is expected to open up by 1990 and that high Btu gas from advanced technology is likely to be economically superior to gas imports over a wide range of alternative assumptions. DOE

N81-23320# Cornell Univ., Ithaca, N. Y.
PYROLYSIS OF COAL-DERIVED FUELS USING THE LASER-POWERED HOMOGENEOUS PYROLYSIS TECHNIQUE
P. C. T. deBoer 31 Jan. 1981 18 p refs
(Contract DE-FG22-80PC-30217)
(DOE/PC-30217/T1) Avail: NTIS HC A02/MF A01

The laser powered homogeneous pyrolysis (LPHP) technique is applied to the formation of soot precursors during pyrolysis of coal derived fuels of high carbon to hydrogen ratio. This technique is particularly attractive for this purpose. The LPHP offers the range of temperatures and heating times required to study the progress of the pyrolysis process. Also, the simplicity of the experimental procedure allows studying many species in a relatively short time. Considerable progress was made in improving the method of data evaluation and in developing the method of taking data. A set of equations was derived describing the motion of the strongly heated gas in the sample cell. A set of measurements was made of the pyrolysis of 1,4-cyclohexadiene. DOE

N81-23321# West Virginia Univ., Morgantown.
COAL GASIFICATION AVAILABILITY ANALYSIS Annual Report, Aug. 1979 - Sep. 1980
C. Y. Wen Sep. 1980 59 p refs Sponsored by Gas Research Inst.
(PB81-153272; GRI-79/0075) Avail: NTIS HC A04/MF A01 CSCL 10A

An availability analysis technique was applied to coal gasification in order to develop an easy method for determining the practical thermodynamic efficiencies of coal gasification processes and the unit operations involved in these processes. Availability analyses, based on both the first and second laws of thermodynamics were made on the Lurgi, Texaco, and Exxon gasification processes. These analyses are based on three known sets of thermodynamic reference states and are being compared to a suggested new set of reference states. A computer code for evaluating thermophysical properties of gas mixtures and liquid mixtures is being compiled and further tested. GRA

N81-23322# Cornell Univ., Ithaca, N. Y. Dept. of Agricultrual Economics.
ETHANOL PRODUCTION IN NORTHERN NEW YORK: TECHNICAL AND ECONOMIC FEASIBILITY Final Report, Apr. - Sep. 1980
Robert J. Kalter, Richard N. Boisvert, Eric C. Gabler, Larry P. Walker, Roger A. Pellerin, Andy M. Rao, and Yong D. Hang
Sep. 1980 336 p refs
(PB81-144438; NYSERDA-80-22) Avail: NTIS HC A15/MF A01 CSCL 05C

The technical and economic viability of converting cheese

whey to ethanol is examined at a variety of scales and with two alternative technologies. In addition, the use of corn as a supplementary feedstock to extend economies of scale is investigated. For the scales of operation and potential locations studied (New York State's North Country Counties Lewis, Jefferson, St. Lawrence and Franklin), whey conversion was found to be feasible and profitable, using presently available equipment and techniques. In the North County alone, more than one billion pounds of cheese whey is left over from the manufacture of cheese annually. The whey is a costly disposal problem for manufacturers. It is estimated that waste could be turned into 2.5 million gallons of ethanol. Ethanol, when blended with unleaded gasoline in a 9:1 ratio, produces gasahol, an octane booster and a gasoline extender. GRA

N81-23323# Bureau of Mines, Avondale, Md. Avondale Research Center.

DEVELOPMENT OF ANALYTICAL REFERENCE MATERIALS FOR REFUSE-DERIVED FUELS

Stephen L. Law, Benjamin W. Haynes, and William J. Campbell 1980 17 p refs

(PB81-135030; BM-RI-8426) Avail: NTIS HC A02/MF A01 CSCL 21D

Municipal solid waste (MSW) represents a significant source of metals and glass together with a combustible fraction that could be used to supplement coal and oil and in generating heat and electricity. Because of increasing interest in this fuel supplement, a refuse-derived fuel material was prepared as a proposed reference material for use by other laboratories to evaluate their analytical procedures. This material was prepared by combining MSW light combustibles from three cities then shredding, milling, and blending the composite material. Homogeneity of the refuse-derived fuel reference material appears to be acceptable based on analytical values for replicate analyses. Concentration data for major, minor, and trace elements together with proximate analyses are provided. GRA

N81-23324# Midwest Research Inst., Kansas City, Mo.

PROCESSING EQUIPMENT FOR RESOURCE RECOVERY SYSTEMS. VOLUME 2: MAGNETIC SEPARATORS, AIR CLASSIFIER AND AMBIENT AIR EMISSIONS TESTS Final Report

B. W. Simister and David Bendersky Jul. 1980 172 p

(Contract EPA-68-03-2387)

(PB81-141590; EPA-600/2-80-007B-Vol-2) Avail: NTIS HC A08/MF A01 CSCL 21D

The results of a study of equipment and systems for processing municipal solid wastes into energy related products are presented. The study was divided into three phases. The first phase was devoted to a study of the state of the art and formulation of the research needs. The second phase was devoted to field tests of magnetic separators, air classifier and air emissions. The third phase is involved with field tests of shredders. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N81-23325# Boeing Aerospace Co., Seattle, Wash. Experience Analysis Center.

DEVELOPMENT OF MAINTENANCE METRICS TO FORECAST RESOURCE DEMANDS OF WEAPON SYSTEMS (PARAMETER POLARIZATION), REVISION A Interim Report, 1 Aug. 1978 - 15 Oct. 1979

Donald K. Hindes, Gary A. Walker, David H. Wilson, and Frank Maher Oct. 1980 320 p refs

(Contract F33615-77-C-0075)

(AD-A097692; D94-10089-2-Rev-A) Avail: NTIS HC A14/MF A01 CSCL 01/3

This report describes the method and results of the fifth of eight tasks to 'Develop Maintenance METRICS To Forecast Resource Demands of Weapon Systems'. The purpose of this task was to analyze the data collected in tasks 1 through 4 to detect, test, and rank relationships between the study parameters and maintenance demand rates. GRA

N81-23326# Army Construction Engineering Research Lab., Champaign, Ill.

CALCULATING BUILDING HEATING AND COOLING LOADS USING THE FREQUENCY RESPONSE OF MULTILAYERED SLABS Ph.D. Thesis - Illinois Univ.

Douglas C. Hittle Feb. 1981 224 p refs

(DA Proj. 4A7-61102-AT-43)

(AD-A097597; CERL-TM-E-169) Avail: NTIS HC A10/MF A01 CSCL 13/1

This thesis describes the development of a method for calculating room heating and cooling loads using frequency response methods to calculate heat flow through multi-layered room walls and roofs. Existing methods for calculating room loads are discussed and the need to consider the effects of thermal mass are emphasized. A detailed derivation of the solution of the transient one-dimensional heat conduction equation for multi-layered slab which leads to the calculation of response factors and conduction transfer functions is presented. Next, the special case of a fixed temperature on one side of a multi-layered slab and a sinusoidal temperature variation on the other side is examined and the simplifications which result are described. This frequency response method for calculating heat flow can be applied to buildings if the outdoor climate can be represented by a reasonably small number of sinusoidal components. To determine the extent of sinusoidal variation in climate, time series analysis techniques were applied to hourly measured weather data from four climatically different sites in order to separate the deterministic periodic behavior in the data from its stochastic behavior. A combined deterministic plus stochastic model was found to be adequate for the climate variables studied. This model included as its deterministic component sinusoids with frequencies corresponding to the annual cycle, the diurnal cycle, and the first harmonic of the diurnal cycle. The use of this method as part of a simplified room load-calculating procedure was compared to results from a more detailed approach, and again, very good agreement was found. GRA

N81-23327# Army Cold Regions Research and Engineering Lab., Hanover, N. H.

BUILDING UNDER COLD CLIMATES AND ON PERMAFROST. COLLECTION OF PAPERS FROM A US-SOVIET JOINT SEMINAR

Dec. 1980 381 p refs Conf. held at Leningrad, USSR, Jun. 1979

(Contract HUD-IA-655)

(AD-A097516; CRREL-SR-80-40) Avail: NTIS HC A17/MF A01 CSCL 13/13

The building of homes and other structures in cold weather poses special design and logistical problems for architects, urban planners, and construction engineers. As the United States expands development in the Arctic and Subarctic regions of North America, access to the research and achievements of other nations experienced in cold weather construction becomes increasingly important. The Soviet Union, with so much of its vast territory lying in the far north, performs about 85 percent of the world's research in this field. For this reason, experts at the U.S. Army Corps of Engineers have actively cooperated with Soviet experts under the framework of the U.S.-U.S.S.R. Agreement on Cooperation in the Field of Housing and Other Construction. The articles in this collection have been classified into the following five sections: Aspects of Architectural Planning, Construction and Environmental Considerations; Principles of Foundation Design and Behavior; Foundation Stabilization; Concrete Construction; and Excavation Techniques. GRA

N81-23328# California State Dept. of Transportation, Sacramento. Office of Transportation Lab.

IN-SITU MEASUREMENT OF SOIL PROPERTIES Final Report

S. B. P. John and R. H. Prysock May 1980 181 p refs

(PB81-130064; TL-632136; FHWA/CA/TL-80/13) Avail: NTIS HC A09/MF A01 CSCL 08M

An Iowa borehole shear device, a vane shear device, a standard penetrometer, Dutch cone penetrometer and a Cambridge self boring pressuremeter were field tested in downtown Sacramento, Rio Vista, and Mare Island in northern California. The in situ tests were conducted in silty sand, silty clay, San Francisco bay mud (recent), peat, and peaty clay. Maximum depth tested was

50 feet. Laboratory tests were conducted on undisturbed samples. The various soil parameters derived from laboratory tests were compared with those from the field tests. The effects of soil disturbance are discussed. A separate report appendix intended for limited distribution (upon request) contains information on modification of probes, adaptation of drill rigs, calibration, testing procedures, boring profiles, and a bibliography. GRA

N81-23329# Portland Cement Association, Skokie, Ill. Construction Technology Labs.

COUPLED WALLS IN EARTHQUAKE-RESISTANT BUILDINGS, MODELING TECHNIQUES AND DYNAMIC ANALYSIS

Murat Saatcioglu, Arnaldo T. Derecho, and W. Gene Corley Jun. 1980 143 p refs

(Grant NSF ENV-77-15333)

(PB81-132698; PCA-SER-1628; NSF/RA-800212) Avail: NTIS HC A07/MF A01 CSCL 13M

This investigation is part of a combined analytical and experimental program to develop design information for earthquake resistant reinforced concrete structural wall systems. Modeling techniques developed and used for dynamic analysis of coupled wall structures are presented. Particular attention is placed on simulation of inelastic action and detailed aspects of hysteretic moment-rotation relationships. The study includes the following: Selection and design of a 20 story coupled wall structure for dynamic analysis; determination of modeling requirements and development of modeling techniques for computer analysis; modification of the computer program to incorporate improved modeling capabilities; and dynamic analysis to test the analytical model and investigate the effects of selected model features on inelastic response of coupled walls. GRA

N81-23330# Swedish Council for Building Research, Stockholm.

THE FINITE ELEMENT METHOD FOR SHEET METAL STRUCTURES - DEVELOPMENT OF A COMPUTER PROGRAM

Anders Eriksson 1980 240 p refs

(PB81-135725; ISBN-91-540-3315-2; D31:1980) Avail: NTIS HC A11/MF A01 CSCL 13M

A finite element model was developed for the analysis of structures made up of thin plate elements. The aim is to ascertain whether the finite element method yields a usable model for the analysis of this type of structure, i.e., to find how the different possible instability phenomena are reproduced and what accuracy is attainable in the results. GRA

N81-23331# Swedish Council for Building Research, Stockholm.

STRESSED SKIN ACTION IN COMPOSITE PANELS COMPRISING STEEL SHEETING AND BOARDS

Peter Balazs 1980 192 p refs

(PB81-135733; ISBN-91-540-3367-5; D40:1980) Avail: NTIS HC A09/MF A01 CSCL 13M

A panel made up of discrete C-shaped panels can be subjected to a shear force which is substantially in excess of the critical shear buckling load for a single panel, provided that the tension field forces are anchored in the adjacent construction and that the shear buckles in the flanges of the panels can be accepted. Since it is the intention that these panels, in combination with sheets of some different material should form part of floor and wall constructions in light-weight building systems, the interest was concentrated on the investigation of the interaction of the board materials with the sheet metal panels when the composite panel is subjected to an in-plane load. The board material chosen in most cases was plasterboard because of its fire resistance properties. GRA

N81-23332# National Bureau of Standards, Washington, D.C. National Engineering Lab.

THERMAL RESISTANCE MEASUREMENTS OF A BUILT-UP ROOF SYSTEM Final Report

S. J. Treado Oct. 1980 28 p refs Sponsored in part by DOE

(PB81-140063; NBSIR-80-2100) Avail: NTIS HC A03/MF A01 CSCL 13M

Factors which affect the thermal performance of built-up roof systems, and a technique for making in-place measurements of thermal resistance are described. This measurement technique utilizes a combination of infrared thermographic imaging, surface heat-flow meters, and surface thermopiles. The thermal resistance of the roof system is computed based on temperature differences across the roof and the measured heat flow through the roof. A field test of the measurement procedure is detailed, along with an examination of the time period required to perform a roof thermal resistance measurement, as related to the thermal time lag for heat flow through the roof due to the effect of the thermal mass of the roof. GRA

N81-23333# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.

IMPROVING THE DISTRIBUTION AND REDUCING THE MAGNITUDE OF PAVEMENT DAMAGE Final Report, Jul. 1977 - Apr. 1979

Walter R. Barker and Uy T. Chou Aug. 1980 68 p refs Prepared for Federal Highway Administration, Washington, D.C.

(Contract DOT-FH-7-3-0067)

(PB81-145864; FHWA/RD-80/025) Avail: NTIS HC A04/MF A01 CSCL 13B

In the analysis of flexible pavement, the layered elastic theory was used to compute the pavement response. For the rigid pavement, finite difference, layered elastic theory, and Westergard procedures were used to compute tensile stresses in concrete that formed the basis for predicting allowable stress repetitions. For flexible pavement, the only effective means to reduce pavement damage was to modify the wheel assembly to reduce stress or strain at the critical locations in the pavement systems. The most effective modification would be to increase the spacing between duals. For rigid pavements, the edge effect was critical, thus suggesting that modifications to shift the loading away from the pavement edge would be effective. GRA

N81-23334# Arkansas Univ., Fayetteville. Dept. of Civil Engineering.

CONSTRUCTION PROCEDURES USING SELF HARDENING FLY ASH Final Report

Sam I. Thornton and David G. Parker Jul. 1980 95 p refs

(PB81-153884; FHWA/AR-80/004) Avail: NTIS HC A05/MF A01 CSCL 13B

Fly ash produced in Arkansas from burning Wyoming low sulfur coal is self-hardening and can be effective as a soil stabilizing agent for clays and sands. The strength of soil-self hardening fly ash develops rapidly when compacted immediately after mixing. Seven day unconfined compressive strengths up to 1800 psi were obtained from 20% fly ash and 80% sand mixtures. A time delay between mixing the fly ash with the soil and compaction of the mixture reduced the strength. With two hours delay, over a third of the strength was lost and with four hours delay, the loss was over half. Gypsum and some commercial concrete retarders were effective in reducing the detrimental effect of delayed compaction. Adequate mixing of the soil and fly ash and rapid compaction of the mixtures were found to be important parameters in field construction of stabilized bases. GRA

N81-23335# National Bureau of Standards, Washington, D.C. National Engineering Lab.

USER ACCEPTANCE OF AN ENERGY EFFICIENT OFFICE BUILDING, A STUDY OF THE NORRIS COTTON FEDERAL OFFICE BUILDING Final Report

Jacqueline Elder and Robert L. Tibbott Jan. 1981 130 p refs Sponsored in part by DOE, Washington, D.C.

(PB81-147365; NBS-BSS-130; LC-80-600188) Avail: NTIS HC A07/MF A01 CSCL 13A

The Genereral Services Administration built the Norris Cotton Federal Office Building in Manchester, New Hampshire and chose it as a demonstration project for studying the effectiveness of energy conservation techniques in the design and operation of a contemporary office building. User acceptance of both the innovative and conventional design features in the building was measured by administering a questionnaire to employees shortly after occupancy of the building and again eight months later. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N81-23336 Pennsylvania Univ., Philadelphia.
SIGNAL PROCESSING IN AN UNCERTAIN ENVIRONMENT: MULTIVARIATE TECHNIQUES OF NONPARAMETRIC AND ROBUST DETECTION Ph.D. Thesis
Marc Bernard DonVito 1980 301 p
Avail: Univ. Microfilms Order No. 8107733

The detection of known signals in additive noise is examined. The received signal is sampled, and the samples are used by the detector to determine whether or not a signal is present. The detectors are designed to provide nonparametric or robust performance when the data samples are statistically dependent. Nonparametric methods are proposed which result in detectors having a fixed false alarm probability. A new type of parametric test, the region test, is proposed. Two robust methods are proposed: the M-detector and the locally robust detector. False alarm and detection probabilities are estimated for both types of detectors, for specific noise distributions, and for signal waveforms. The performance of these detectors for nominal distributions and for classes of noise distribution functions is evaluated using finite-sample and asymptotic performance measures. Dissert. Abstr.

N81-23337 Pennsylvania Univ., Philadelphia.
INTERFERENCE CANCELLATION IN SELF-COHERING ARRAYS Ph.D. Thesis
Chung Hsin Lu 1980 335 p
Avail: Univ. Microfilms Order No. 8107773

Self-cohering of a large, random, nonrigid antenna array in the presence of interference is investigated. Methods for local cancellation of interference at each array element are presented. The self survey system is described. A phase shift control loop and a gain phase shift control loop are derived and applied. The interference residue associated with gain phase shift control loops is shown to result in a tolerable beacon signal phase distortion. Interference cancellation using single elements with controllable radiation patterns is applied to an element pair subarray, a linear subarray, and a circular subarray. This spatial filtering technique is recommended as the most promising scheme for application in self-cohering arrays. Methods for resolution of phase measurement ambiguities associated with self survey are presented. The phase center concept in an antenna array is investigated. Dissert. Abstr.

N81-23338 Southern Methodist Univ., Dallas, Tex.
EFFICIENT SPECTRUM UTILIZATION IN MOBILE RADIO COMMUNICATION SYSTEMS Ph.D. Thesis
Said Mohamed Elnoubi 1980 118 p
Avail: Univ. Microfilms Order No. 8107436

The problem of efficient spectrum utilization in mobile radio communication systems is addressed. A frequency channel assignment algorithm is proposed and studied by computer simulations for applications to mobile telephone systems and combined mobile telephone and dispatch systems. Spectrum efficient modulation techniques, namely, Duobinary Coded MSK and TFM are studied for the application of data transmission via mobile radio. The performance of coherent and noncoherent detections is studied under the mobile radio environments. The probability of error is calculated for both discriminator detection and differential detection. The steady state phase error probability of a digital phase locked loop with a phase step input is calculated under the fast fading mobile radio environments. Dissert. Abstr.

N81-23339 Ohio State Univ., Columbus.
ELECTROMAGNETIC SCATTERING BY OPEN CIRCULAR WAVEGUIDES Ph.D. Thesis
Thomas Wesley Johnson 1980 130 p
Avail: Univ. Microfilms Order No. 8107347

Open circular waveguides are used to model jet engine inlets. The exact Wiener-Hopf solution for scattering by a semi-infinite cylinder is studied in the resonance region, where the cylinder diameter is of the order of a wavelength. In particular, the Wiener-Hopf factorization functions are calculated by numerical integration and compared to various approximations to define regions of validity. Scattering from the rim is studied as a function of frequency, incidence angle, and time. A ray-optic model for rim backscatter is discussed. The relative power absorption of the five lowest order waveguide modes is evaluated. Coupling of incident plane waves to waveguide modes, and radiation by these modes are shown to be related by reciprocity. The waveguide termination model for a jet engine assumes an incident waveguide mode strikes an axially symmetric cone on a flat plate. The various techniques for evaluating scattering by this structure are discussed, and the problem is solved for a few cases. Dissert. Abstr.

N81-23340 Cincinnati Univ., Ohio.
POLYURETHANE FAN-OUT WAVEGUIDE ARRAYS AND COMPUTER SIMULATION TO CONTROL CROSSTALK IN IMAGING ARRAYS Ph.D. Thesis
Delvan Arthur Ramey 1980 296 p
Avail: Univ. Microfilms Order No. 8107500

A fan out waveguide array structure which allows additional freedom in selecting detector element spacing is reported. Thus crosstalk due to substrate processes, the primary limiting factor, can be suppressed while still meeting the resolution requirements of the system. This is possible without resorting to expensive epitaxial isolation layers, which also decrease sensitivity. The fan out structure reported was fabricated using a polyurethane process. This process, and suggested future work, offer high quality waveguides without the expense and difficulty of sputtered glass films or preferentially etched V-grooves. To complement this experimental work, a computer simulation of the detector array was developed. This is a first step in development of computer aided design tools for integrated optics system design, especially on semiconductor substrates. Given detector spacings and widths, and basic substrate parameters, the CRSSTALK. WATFIV program calculates overall crosstalk, including that due to finite spotsize of a lens. This simulation clearly indicates the need for either epitaxial isolation layers or a fan out waveguide array. The effect of crosstalk upon detector array MTF is discussed. Dissert. Abstr.

N81-23341 Ohio State Univ., Columbus.
IMMITTANCE PROPERTIES OF LARGE FINITE DIELECTRIC COVERED PHASED ARRAYS Ph.D. Thesis
Keith Alan Shubert 1980 250 p
Avail: Univ. Microfilms Order No. 8107392

A method is presented for analyzing large finite phased arrays of antennas. The foundation for the procedure lies in a recently developed method for analyzing periodic surfaces. That method begins with the vector potential for a two dimensional array of Hertzian dipoles expressed as a double infinite sum of spherical waves. The Poisson sum formula with a Fourier transform and inverse transform then yields a double infinite sum of plane, inhomogeneous waves. Simulating a finite array is accomplished by modulating the input forcing function (current in the dipole case, voltage in the aperture cases) in such a way as to form an infinite number of finite arrays, separated by areas with zero forcing function. The response function (voltage for dipoles, current for apertures) is calculated with the immittance being the ratio of the forcing and response functions. Dissert. Abstr.

N81-23342 British Broadcasting Corp., Kingswood (England). Engineering Div.
DIGITAL TRANSMISSION TESTS OF MULTIPLEXED VIDEO AND AUDIO SIGNALS AT 60 MBIT/S VIA ORBITAL TEST SATELLITE (OTS)
N. D. Wells Dec. 1980 25 p refs
(BBC-RD-1980/16) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

In a series of experiments carried out during March 1979 in which 60 Mbit/s digital television signals were transmitted via the OTS from Goonhilly Downs Satellite Earth Station, the error rate in the digital television signal was measured over a range of system operating conditions which included simulations of co-channel and adjacent-channel interference from other satellite channels. Particular reference is made to those operating

conditions which are specified for large Earth stations in the future European Communications Satellite (ECS) system. A.R.H.

N81-23343*# Stanford Univ., Calif.
ON SOURCE RADIATION Interim Report
Harold Levine Apr. 1980 24 p refs
(Contract NCC2-55)
(NASA-CR-166176; SU-JIAA-TR-29) Avail: NTIS HC A02/MF A01 CSCL 20N

The power output from given sources is usually ascertained via an energy flux integral over the normal directions to a remote (far field) surface; an alternative procedure, which utilizes an integral that specifies the direct rate of working by the source on the resultant field, is described and illustrated for both point and continuous source distribution. A comparison between the respective procedures is made in the analysis of sound radiated from a periodic dipole source whose axis performs a periodic plane angular movement about a fixed direction. Thus, adopting a conventional approach, Sretenskii (1956) characterizes the rotating dipole in terms of an infinite number of stationary ones along a pari of orthogonal directions in the plane, and through the far field representation of the latter, arrives at a series development for the instantaneous radiated power, whereas the local manner of power calculation dispenses with the equivalent infinite aggregate of sources and yields a compact analytical result. Author

N81-23344*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AN ANALYSIS OF SOURCE STRUCTURE EFFECTS IN RADIO INTERFEROMETRY MEASUREMENTS
J. B. Thomas 15 Dec. 1980 92 p refs
(Contract NAS7-100)
(NASA-CR-164285; JPL-Pub-80-84) Avail: NTIS HC A05/MF A01 CSCL 20N

To begin a study of structure effects, this report presents a theoretical framework, proposes an effective position approach to structure corrections based on brightness distribution measurements, and analyzes examples of analytical and measured brightness distributions. Other topics include the effect of the frequency dependence of a brightness distribution on bandwidth synthesis (BWS) delay, the determination of the absolute location of a measured brightness distribution, and structure effects in dual frequency calibration of charged particle delays. For the 10 measured distributions analyzed, it was found that the structure effect in BWS delay at X-band (3.6 cm) can reach 30 cm, but typically falls in the range of 0 to 5 cm. A trial limit equation that is dependent on visibility was successfully tested against the 10 measured brightness distributions (seven sources). If the validity of this particular equation for an upper limit can be established for nearly all sources, the structure effect in BWS delay could be greatly reduced without supplementary measurements of brightness distributions. Author

N81-23345*# International Telephone and Telegraph Corp., New York.
MARKET CAPTURE BY 30/20 GHz SATELLITE SYSTEMS. VOLUME 1: EXECUTIVE SUMMARY Final Report
R. B. Gamble and L. Saporta (Data Industries Corp.) Apr. 1981 42 p
(Contract NAS3-21366)
(NASA-CR-165231) Avail: NTIS HC A03/MF A01 CSCL 17B

Demand for 30/20 GHz satellite systems over the next two decades is projected. Topics include a profile of the communications market, switched, dedicated, and packet transmission modes, deferred and real-time traffic, quality and reliability considerations, the capacity of competing transmission media, and scenarios for the growth and development of 30/20 GHz satellite communications. J.M.S.

N81-23346*# International Telephone and Telegraph Corp., New York.
MARKET CAPTURE BY 30/20 GHz SATELLITE SYSTEMS, VOLUME 2 Final Report
R. B. Gamble and L. Saporta (Data Industries Corp.) Apr. 1981 283 p refs
(Contract NAS3-21366)
(NASA-CR-165232) Avail: NTIS HC A13/MF A01 CSCL 17B

Results of a telecommunications demand study are presented. Forecasts of demand for 30/20 GHz satellite systems, and the expected build up of traffic on these systems are given as a function of time for each of several operational scenarios. J.M.S.

N81-23347*# Western Union Telegraph Co., McLean, Va. Government Systems Div.
THE 30/20 GHz COMMUNICATIONS SYSTEM FUNCTIONAL REQUIREMENTS Final Report
C. M. Siperko, M. Frankfort, R. Markham, and M. Wall Mar. 1981 226 p
(Contract NAS3-22461)
(NASA-CR-165301) Avail: NTIS HC A11/MF A01 CSCL 17B

The characteristics of 30/20 GHz usage in satellite systems to be used in support of projected communication requirements of the 1990's are defined. A requirements analysis which develops projected market demand for satellite services by general and specialized carriers and an analysis of the impact of propagation and system constraints on 30/20 GHz operation are included. A set of technical performance characteristics for the 30/20 GHz systems which can serve the resulting market demand and the experimental program necessary to verify technical and operational aspects of the proposed systems is also discussed. E.D.K.

N81-23348# ITT Avionics, Nutley, N.J. Electro-Optical Systems Dept.
S-BAND MICROWAVE SYSTEM, REVISION Final Report
18 Dec. 1980 136 p refs
(Contract DAAK70-79-C-0171)
(AD-A097641) Avail: NTIS HC A07/MF A01 CSCL 20/9

This report presents the basic material that was used to develop the cavity design. A partial reference list is included concerning only those aspects that are fundamental to the problem. From this, we have refined our understanding of the interface conditions between the plasma, the plasma envelope, and the waveguide. Factors such as the latter, however, must not dictate the cavity design because such high sensitivity would not permit stable operation. The design has been based on the ability to adapt to all reasonable modifications such an experimental system might encounter. To this end the structure is a large diameter cavity containing a number of longitudinal half wave periods. Both standing waves and travelling waves can be introduced. Linearly, lavio and dextro rotary circularly polarized waves can be introduced. The cavity size is sufficiently large to permit insertion of various potential configurations such as involve the increase in the in-guide, wavelength, loosely coupled consecutive 1/2 wave cavities, slow wave structures and conical cavities. The reflectivity of the interior of the microwave cavity is sufficiently high to reduce the radiative transfer between the microwave cavity wall and the plasma envelope. GRA

N81-23349# Hughes Research Labs., Malibu, Calif.
MAXIMUM ENTROPY IMAGE ESTIMATION ANALYSIS OF IMAGE FORMATION WITH THINNED RANDOM ARRAYS Final Report, 15 Feb. 1978 - 31 Aug. 1980
Bernard H. Soffer and Ryoichi Kikuchi Feb. 1981 150 p refs
(Contract F49620-77-C-0052; AF Proj. 2305)
(AD-A097357; AFOSR-81-0324TR) Avail: NTIS HC A07/MF A01 CSCL 05/8

The imaging behavior of thinned, or sparse arrays of small antennas, or apertures was investigated and their imaging quality studied using computer simulation for coherent, partially coherent and incoherent radiation. In the maximum entropy method for reconstructing the imagery, the most probable object consistent with the measured signal image data and the noise is selected as the estimated object. The entropy is the logarithm of the probability. The constrained entropy is analogous to the free energy of statistical mechanics. This analogy is used to consider the problem of fluctuations, or noise in a natural way. The degree of confidence in the ME estimate is derived in a general manner by expanding the object probability distribution near the maximum as a multivariate Gaussian and making a principal axis transformation. GRA

N81-23350# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
DETECTION THRESHOLDS FOR MULTITARGET TRACKING IN CLUTTER Interim Report, Jun. - Dec. 1980
Thomas E. Fortmann, Yaakov Bar-Shalom, and Molly Scheffe Jan. 1981 52 p refs
(Contract N00014-80-C-0270; NR Proj. 274-331)
(AD-A097188; BBN-4605) Avail: NTIS HC A04/MF A01 CSCL 12/1

Tracking performance depends upon the quality of the measurement data. In the Kalman-Bucy filter and other trackers, this dependence is well-understood in terms of the measurement noise covariance matrix, which specifies the uncertainty in the values of the measurement inputs. When the origin of the measurements is also uncertain, one has the widely-studied problem of data association (or data correlation), and tracking performance depends critically on additional parameters, primarily the probabilities of detection and false alarm. In this paper we derive a modified Riccati equation that quantifies (approximately) the dependence of the state error covariance on these parameters. We also show how to use an ROC curve in conjunction with the above relationship to determine an 'optimal' detection threshold in the signal processing system that provides measurements to the tracker. Author (GRA)

N81-23351# Mark Resources, Inc., Marina Del Rey, Calif.
ENVIRONMENT-ADAPTIVE RADAR TECHNIQUES Interim Report, 19 Sep. 1979 - 19 Sep. 1980
J. E. Howard, G. W. Lank, and A. W. Rihaczek Feb. 1981 106 p
(Contract F19628-79-C-0166; AF Proj. 4600)
(AD-A097262; MRI-179-9; RADC-TR-80-367) Avail: NTIS HC A06/MF A01 CSCL 17/9

This report describes the work performed in the first year of a contract to investigate the measurement and mitigation of environmental effects in a selected modern radar system. The baseline system is a mobile ground-based tactical radar system which performs wide-area surveillance for aircraft targets as well as multiple target tracking for eventual handover. The dominant technical problem is found to be the blind-speed problem. A computer-automated design procedure is therefore developed. It is found that, by subdividing the search area into two range zones, it is possible to develop solutions at S-band and higher frequencies. An environment-adaptive radar that incorporates the computer-automated design algorithms is designed to the block diagram level, and the algorithms are detailed in FORTRAN code. Plans for the next phase of the contract include simulations, sensitivity studies, and the design of the environmental sensor and its integration into the radar system. Author (GRA)

N81-23352# Electronic Systems Div., Hanscom AFB, Mass.
CHALLENGES AND OPPORTUNITIES IN AIR FORCES TACTICAL COMMUNICATIONS
Donald B. Brick and Fred W. Ellersick (Mitre Corp.) Feb. 1981 11 p refs Presented at the IEEE Natl. Telecommun. Conf., 3 Dec. 1980
(AD-A097677; ESD-TR-81-115) Avail: NTIS HC A02/MF A01 CSCL 17/2

During the 1980s, many improvements will be made in the ability of the U.S. Air Force to communicate in a battlefield environment via programs like JTIDS, SEEK TALK, TRI-TAC, and the Ground Mobile Forces satellite communications terminals. Even after these programs have been implemented, however, some important problem areas, or challenges, will remain, especially in our ability to resist determined electronic-warfare and physical attacks. This paper first describes the challenges that will remain after the implementation of the currently planned programs. Some important technology opportunities are then identified that hold promise for meeting some of the challenges in the 1990s. In addition, some system approaches are suggested for exploiting these technology opportunities, and for improving our use of older technologies. These system approaches emphasize adaptive network techniques, network management/control, packet switching, and joint-service common-user systems. Author (GRA)

N81-23353# Ohio State Univ., Columbus. ElectroScience Lab.
RESEARCH ON NEAR FIELD PATTERN EFFECTS Final Report
W. D. Burnside and N. Wang Jan. 1981 20 p refs
(Contract N00019-80-C-0050)
(AD-A097102; ESL-712527-4) Avail: NTIS HC A02/MF A01 CSCL 20/14

This report is a summary of the research accomplishments achieved during the present contract period. Our main objective has been to develop an efficient numerical solution to compute the near as well as far field radiation patterns for an antenna mounted on a prolate spheroid. Note that the prolate spheroid will be used in the future to simulate the fuselage of a general aircraft. The uniform Geometrical Theory of Diffraction solutions which were developed previously were used to analyze the radiation from the prolate spheroid; however they require one to identify the appropriate geodesic paths. These geodesic paths indicate the flow of energy as it propagates around the spheroid. Using a cone perturbation model, an efficient numerical solution for the geodesic paths and the associated radiation patterns has been obtained. This solution was also extended to analyze the scattering from a finite flate plate which was illuminated by energy propagating around the spheroid. However, the flate plate can not be any closer than a few wavelengths to the spheroid. This shortcoming will be corrected in the near future. Author (GRA)

N81-23354# Mitre Corp., Bedford, Mass.
USER'S MANUAL FOR STRATEGIC SATELLITE SYSTEM TERMINAL SEGMENT LIFE CYCLE COST MODEL, VOLUME 1
Jane E. Cox and David B. Peters Mar. 1981 321 p 2 Vol.
(Contract F19628-81-C-0001; AF Proj. 6340)
(AD-A097634; MTR-8102-Vol-1; ESD-TR-81-111-Vol-1) Avail: NTIS HC A14/MF A01 CSCL 05/3

A computerized Life Cycle Cost (LCC) Model has been developed for the Strategic Satellite System (SSS) Terminal Segment Program. The model is tailored for this program in its structuring of terminal equipment and in the particular trade-off analyses which it supports. The model emphasizes system support costs and design related cost drivers such as reliability and installation. A capability to study the cost trade-offs between fault isolation using built-in test equipment and using peculiar support equipment is included. The model also considers three-level maintenance philosophies which include centralized intermediate maintenance facilities. Volume 1 of this User's Manual provides detailed instructions for entering data and running the LCC Model through step-by-step instructions and illustrative runs. All Air Force inputs to the model equations are also provided. Volume 2 provides listings of the FORTRAN source code for the three programs comprising the model. This document is a part of the SSS Request for Proposal Package, and is specifically a supplement to the Statement of Work in that package. The model is intended to be used in SSS Source Selection. Author (GRA)

N81-23355# Mitre Corp., Bedford, Mass.
USER'S MANUAL FOR STRATEGIC SATELLITE SYSTEM TERMINAL SEGMENT LIFE CYCLE COST MODEL, VOLUME 2
Jane E. Cox and David B. Peters Mar. 1981 292 p 2 Vol.
(Contract F19628-81-C-0001; AF Proj. 6340)
(AD-A097635; MTR-8102-Vol-2; ESD-TR-81-111-Vol-2) Avail: NTIS HC A13/MF A01 CSCL 05/3

This volume contains listings of the FORTRAN source code for the three programs comprising the model. These three programs are the Preprocessor, the LCC Program, and the RLA program. GRA

N81-23356# California Inst. of Tech., Pasadena. Antenna Lab.
THE DEVELOPMENT AND APPLICATION OF NOVEL METHODS FOR THE SOLUTION OF EMP SHIELDING PROBLEMS Final Report
Charles H. Papas Feb. 1981 37 p refs
(Grant AF-AFOSR-3451-77; AF Proj. 2301)
(AD-A097362; AFOSR-81-0336TR) Avail: NTIS HC A03/MF A01 CSCL 18/6

The purpose of this report is to summarize the electromagnetic research that was performed through the support of AFOSR.

The problems worked on pertain to EMP shielding theory and deal with (a) the transmission of electromagnetic waves through small apertures, (b) the propagation of electromagnetic waves through chiral media, (c) the steady state and transient electromagnetic coupling through slabs, and (d) the ponderomotive forces and torques produced by electromagnetic waves.
Author (GRA)

N81-23357# Rome Air Development Center, Griffiss AFB, N.Y. Telecommunications Branch.
ACCESS PROTOCOL FOR A PARALLEL WIDEBAND LOCAL DIGITAL COMMUNICATION NETWORK - PROPOSED STANDARD
James L. Davis Feb. 1981 66 p refs
(AF Proj. 2317)
(AD-A097354; RADC-TR-80-408) Avail: NTIS HC A04/MF A01 CSCL 17/2

This report documents a proposed standard for an access protocol for interface to high capacity wideband general purpose data/communications busing system known as a 'Flexible Intraconnect.' An advanced development program is underway at RADC to design, fabricate, test and document a Flexible Intraconnect system. The objective of the development program is to prove the suitability of the Flexible Intraconnect (FI) bus technology as a standard approach to implementing military command, control and communications systems. Accordingly, documentation has been prepared describing technical characteristics and requirements of the FI. The FI System Specification No. SS07877940000 defines design parameters for the FI. A second document, called 'MIL-STD-FI' describes the FI in terms of how to interface with and gain access to information distribution services provided by the FI. This report contains the results of an in-house effort to define the access protocol to the Flexible Intraconnect. This work is presented in a form suitable for incorporation into a Military Standard. Author (GRA)

N81-23358# Army Aviation Development Test Activity, Fort Rucker, Ala.
FUNCTIONAL TESTING AIRBORNE RADARS Final Report
27 Mar. 1981 37 p refs
(AD-A097562; TOP-6-3-223; DARCOM-R-310-6; DRSTE-RP-702-105) Avail: NTIS HC A03/MF A01 CSCL 17/9

This document provides guidance and procedures for planning and conducting performance tests on airborne radar systems. The document addressed the following radar systems: Weather, Terrain Avoidance, and Airborne Transponders. It provides the test project officer with general information and guidance in test preparation, test controls, test implementation/conduct and data reduction. Author (GRA)

N81-23359# Naval Research Lab., Washington, D. C. Antenna Radar Branch.
PHASE SYNCHRONIZING, A NONRIGID, DISTRIBUTION TRANSMIT-RECEIVE RADAR ANTENNA ARRAY Interim Report
B. D. Steinberg 9 Apr. 1981 39 p refs
(WF12141604)
(AD-A097486; NRL-MR-4475) Avail: NTIS HC A03/MF A01 CSCL 17/9

This paper describes means for self-organizing a nonrigid, distributed, transmit-receive antenna array for use in airborne radar. The techniques are applicable to ground-based or shipborne radar as well. Methods are described for initializing the array using various primary microwave illuminators. The description of phase conjugation techniques and means for distributing phase reference to all elements in the array are the central parts of the paper. Author (GRA)

N81-23360# Naval Postgraduate School, Monterey, Calif.
SIGNAL SELECTOR, SPECTRUM RECEIVERS AND TOUCH PANEL CONTROL FOR THE SATCOM SIGNAL ANALYZER
Davis R. Gamble and John E. Ohlson Jun. 1980 217 p refs
(AD-A097532; NPS62-80-013) Avail: NTIS HC A10/MF A01 CSCL 14/2

This report documents the design, development, construction, and integration of two major modules and the software interface between the operator and the hardware of the SATCOM Signal Analyzer (SSA). The two modules are the Signal Selector and the Spectrum Receiver. Each SSA contains one Signal Selector which is the system's computer controlled switching network. Laboratory test procedures and results are contained in this report. The SSA has four computer controlled Spectrum Receiver chains which provide real-time multi-channel analysis of satellite downlink signals and local uplink signals. Real-time analysis includes the capability to observe the frequency spectrum with one of four display bandwidths. Laboratory test procedures are documented in this report. The menu concept of operation provides the operator-hardware interface. A menu is a video display of information and a series of buttons presented to the operator on the Hewlett-Packard (HP) 2649A Display Terminal. This report examines the menu concept from source file to display on the operator's console and backup display on the CONRAC QQA-17 large screen video monitor. GRA

N81-23361# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL COMPARISON OF PUMPED SUPERLUMINAL ELECTROMAGNETIC RADIATION TO CERENKOV RADIATION M.S. Thesis
Jerry Lee Graham Dec. 1980 67 p refs
(AD-A097571) Avail: NTIS HC A04/MF A01 CSCL 20/3

Experiments were conducted to measure the intensity of radiation emitted by a superluminal 100 MeV electron moving through a static, periodic, plane polarized magnetic field oriented perpendicular to the electron's trajectory. Such radiation is known as pumped superluminal electromagnetic radiation (PSER). Comparison was then made with the intensity of Cerenkov radiation emitted by a superluminal 100 MeV electron without a pump field. It was found that the PSER was 12.78% + or - 0.75% more intense than the Cerenkov radiation. Author (GRA)

N81-23362# Naval Postgraduate School, Monterey, Calif.
FREQUENCY RECEIVER DEVELOPMENT FOR THE SATELLITE COMMUNICATIONS (SATCOM) SIGNAL ANALYZER
Carl L. Schone and John E. Ohlson Jun. 1980 162 p refs
(Contract N00039-80-WR-09137)
(AD-A097664; NPS62-80-015) Avail: NTIS HC A08/MF A01 CSCL 17/2

Design, operation, and system integration of the Frequency Receiver portion of the Satellite Communications Signal Analyzer (SSA) are presented. This component of the SSA, which is currently under development by the Naval Postgraduate School with the sponsorship of the Naval Electronic Systems Command, has an extensive linear dynamic processing range (of the order of 125 dB), measures the carrier frequency of received signals with great accuracy (+/- 1 Hz), and displays the received signal in vector format. Also presented are details on receiver module descriptors and construction details. The Frequency Receiver, as one component of the SSA, will be used to assist in the management of communications traffic via Navy satellites and the performance of some radio frequency interference (RFI) functions. GRA

N81-23363# Naval Postgraduate School, Monterey, Calif.
DEVELOPMENT OF THE TEST UNIT FOR THE SATCOM SIGNAL ANALYZER
Lawrence E. Troffer and John E. Ohlson Jun. 1980 303 p refs
(AD-A097666; NPS62-80-014) Avail: NTIS HC A14/MF A01 CSCL 17/2

The Satellite Communications Signal Analyzer (SSA) has been designed and constructed at the Naval Postgraduate School. Included in the SSA is a set of self-test and calibration subsystems, collectively known as the TEST UNIT. This report documents the design and construction of the TEST UNIT. It addresses design philosophy, technical design aspects, test procedures and applications of the TEST UNIT in the SSA. Author (GRA)

N81-23364# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
A COMPARISON OF MONOPULSE AND INTERFEROMETRIC SYSTEMS Interim Report
Robert B. Dybdal 15 Mar. 1981 33 p refs
(Contract F04701-80-C-0081)
(AD-A097656; TR-0081(6930-06)-1; SD-81-TR-15) Avail: NTIS HC A03/MF A01 CSCL 17/9

The angular error performance of monopulse and interferometric systems is derived and used as a basis to compare the characteristics of the two techniques. The angular error performance of the interferometric system is achieved at the expense of ambiguities in its response and the use of monopulse circuitry with the interferometric elements was investigated as a means of resolving the ambiguities, a technique which appears to be previously unexplored. A statistical analysis was developed which expresses the probability of correct ambiguity resolution in terms of the monopulse performance and the relative size between the interferometric antenna and its baseline. The angular coverage and signal sensitivity of the two systems are dictated by their respective antenna characteristics; for the same angular error performance, the interferometric system achieves a larger coverage at the expense of signal sensitivity. The choice of a particular technique for a specified application depends on the interplay of the system requirements and the characteristics of the two techniques. Author (GRA)

N81-23365# Illinois Univ. at Urbana. Coordinated Science Lab.

NEW TECHNIQUES IN DIGITAL SIGNAL PROCESSING FOR SYNTHETIC APERTURE RADAR Final Report, 1 Jan. 1979 - 31 Dec. 1980

W. K. Jenkins Feb. 1981 15 p refs
(Grant AF-AFOSR-0029-79; AF Proj. 2304)
(AD-A097279; AFOSR-81-0321TR) Avail: NTIS
HC A02/MF A01 CSCL 17/9

Research supported by this grant has been concentrated in four distinct, but related projects: (1) an analysis of inherent phase distortion in rectangular and polar format FFT processing algorithms, (2) a SAR computer simulation with polar format recording, (3) a study of 2D interpolators for polar-to-rectangular coordinate transformation, and (4) an investigation of number theoretic concepts for high speed failure resistant digital processors required in real-time SAR systems. Author (GRA)

N81-23366# Massachusetts Inst. of Tech., Cambridge. Electronics Research Lab.

ATMOSPHERIC OPTICAL COMMUNICATION SYSTEMS Final Report, 22 Oct. 1979 - 21 Jan. 1981

R. S. Kennedy Feb. 1981 310 p refs
(Contract DAAG29-80-C-0010)
(AD-A097673; ARO-17158.1-A-EL) Avail: NTIS
HC A14/MF A01 CSCL 17/2

The performance of off-axis optical communication receivers is considered. A statistical model of the photodetection process is presented and the influence of the received field statistics on the photodetection process is discussed. Upper and lower bounds on the probability of bit error for binary, one-shot, digital communication systems utilizing direct detection are developed. These bounds are based on the Bhattacharyya distance measure. A computer program is developed, which when interfaced with existing programs that model the propagation of optical radiation through the atmosphere, predicts the probability of bit error performance for off-axis optical communication systems. Author (GRA)

N81-23367# CNR, Inc., Needham, Mass.

CHANNEL MEASUREMENT DECODING FOR TROPOSCATTER COMMUNICATIONS Final Technical Report

David Chase Feb. 1981 113 p refs
(Contract F30602-77-C-0182; AF Proj. 4519)
(AD-A097620; RADC-TR-81-7) Avail: NTIS
HC A06/MF A01 CSCL 17/2

The object of this program is to theoretically investigate and experimentally verify the performance improvement possible by the use of channel-measurement (soft-decision) information when decoding an interleaved (24,12) Golay code. The experimental results obtained during this effort indicate that under certain conditions, such as pulse jamming, significant gains can be achieved by the use of channel measurement decoding. For typical multipath profiles, coding gains in the 5 to 10 dB range have been achieved by fairly simple binary decoding techniques. Unfortunately, the predicted theoretical gains due to the use of channel measurement decoding have not been achieved by the experimental results. While channel measurement decoding did offer a 3-dB gain over binary decoding for flat fading, this gain is well below the theoretical prediction of 7.2 dB. The discrepancy between the theoretical and experimental results is still an open question which may be resolved by future work in this area. Nevertheless, in the presence of pulse jamming, channel measurement decoding doubled the effective pulse duration that can be handled by the Golay code. This result is in agreement with theory and a strong indication of the importance of optimum decoding techniques in an ECCM environment. GRA

N81-23368# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Electrical and Computer Engineering.

SUPPRESSION OF NARROWBAND INTERFERENCE IN PSEUDO-NOISE SPREAD SPECTRUM SYSTEMS Final Technical Report, 1 Jun. 1979 - 30 Sep. 1980

John G. Proakis and John W. Ketchum Feb. 1981 115 p refs Prepared in cooperation with Northeastern Univ., Boston
(Contract F30602-78-C-0102; AF Proj. 2305)
(AD-A097336; RADC-TR-81-6) Avail: NTIS
HC A06/MF A01 CSCL 09/3

This report describes results of an investigation of narrowband interference suppression in a pseudo-noise (PN) spread spectrum digital communication system in which the signal is also distorted by channel multipath and fading. Techniques for determining the coefficients of a linear, interference suppression filter are described, which are based on linear prediction and conventional spectral analysis methods. Numerical results are presented on the effectiveness of the linear filter in suppressing the interference. Error rate results obtained via Monte Carlo simulation are presented for a receiver that employs interference suppression and equalization for a fading multipath channel. Author (GRA)

N81-23369# Pennsylvania Univ., Philadelphia.

DEGRADATION OF THE PERFORMANCE OF COMMUNICATION SYSTEMS IN THE PRESENCE OF INTERFERENCE Technical Report, 1979 - 1980

Shaw-Yueh Lin and R. M. Showers Jan. 1981 51 p refs
(Contract N00140-79-C-6628)
(AD-A097685; MS-EES-TR-81-1) Avail: NTIS
HC A04/MF A01 CSCL 09/4

The relationship between measures of degradation (for digital systems: error probability; and for analog systems: articulation score) has been examined for the purpose of establishing quantitative criteria for satisfactory performance of various modulation systems in the presence of various types of interference. Two empirical relationships are proposed which, with adjustment of only two parameter values, provide good correspondence between signal-to-interference ratio and the performance measure for each case. Author (GRA)

N81-23370# Ruhrkohle A.G., Essen (West Germany).

FLAMEPROOF TELEVISION CAMERA SET FOR THE OBSERVATION OF COAL SEAMS AND ROCK STRATA AS WELL AS OF TECTONIC SURFACES IN UNDERGROUND BOREHOLES Final Report

Wolfgang Brenken and Bruno Wagener Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 100 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-80-149; RAG-163) Avail: NTIS (US Sales Only)
HC A05/MF A01; DOE Depository Libraries

A TV camera set comprising smaller structural elements was designed and subjected both to comprehensive tests as well as to practical trials for identification of any weak points. All the components of the TV camera set, including the small cable hoist, fit in one transport case which minimizes the risk of damages during transport. Since the dimensions of the casings were reduced, they can be rapidly placed at the borehole mouth. The cable hoist allows a constant speed of introduction/withdrawal. Ease of evaluation was provided for by inserting a data line in the image and by storing the borehole image on video tape. A compressed air-operated cable hoist as well as 66 bar test pressure on the probe sleeves allow an observation of boreholes as deep as 600 m. Borehole television is a simple and economic means of exploration ahead of coal faces in order to safely complete information on deposits. The observation of boreholes of more than 600 m depth requires different technologies. DOE

N81-23371# California Univ., Livermore. Lawrence Livermore Lab.
MFTF THOMSON SCATTERING: A SYSTEM STUDY
A. M. Frank 11 Sep. 1980 42 p refs
(Contract W-7405-eng-48)
(UCRL-53051) Avail: NTIS HC A03/MF A01

The design for a Thomson scattering diagnostic system for MFTF is described. The principal problem is obtaining enough photons, in the presence of a poorly known background, to make satisfactory measurements. Design concepts for imaging and detection are discussed. The ability of components to survive in the high radiation environment of MFTF is identified as an important problem. The transition to MFTF-B makes many of the problems identified here more serious. DOE

N81-23372# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
GRIDNET Interim Report
Raymond T. Moore Oct. 1980 75 p refs Sponsored in part by Defense Nuclear Agency
(PB81-144370; NBSIR-80-2149) Avail: NTIS HC A04/MF A01 CSCL 17B

A highly reliable and survivable digital data communication system is based on the multiple interconnection of dual fiber optic loops, with up to about twenty data communications stations being served by each dual loop. The dual loop configuration is called CROSSFIRE. The interconnection of many of these to form a large network is called GRIDNET. The network is highly connected and many alternate routes are available for transmitting a message between two stations located at different points on the network. The intelligence required for the control of communications and the routing of traffic is distributed among a number of data communication nodes called gateway stations. Network survival is not dependent on the survival of any node or link, but requires instead that the network not be fragmented. GRA

N81-23108# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany).
UTILIZATION ANALYSIS OF THE EXPERIMENTAL SATELLITE SYSTEM SYMPHONIE [ANALYSES DES UTILISATIONS DU SYSTEME EXPERIMENTAL SYMPHONIE]
J.-M. Duniau and R. Menzel *In* CNES Symphonie Symp. 1980 p 79-86 In FRENCH; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23109# Deutsche Bundespost, Raisting (West Germany). Erdefunkstelle.
EXPERIMENTS SELECTED FOR THE TELECOMMUNICATIONS TEST PROGRAM OF THE GERMAN POST OFFICE [AUSGEWAEHLTE EXPERIMENTE DES FERNMELDETECHNISCHEN VERSUCHSPROGRAMMS DER DEUTSCHEN BUNDESPOST]
E. Jahries *In* CNES Symphonie Symp. 1980 p 87-102 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23111# Indian Space Research Organization, Ahmedabad.
SATELLITE TELECOMMUNICATIONS EXPERIMENTS PROJECT: AN OVERVIEW
O. P. N. Calla and J. Basu (Government of India, New Delhi) *In* CNES Symphonie Symp. 1980 p 117-124 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23113# Deutsche Bundespost, Darmstadt (West Germany). Fernmeldetechnisches Zentralant.
TRANSMISSION OF TDMA SIGNALS AT 60 Mbit/s IN THE SYMPHONIE SYSTEM
T. Hentrich *In* CNES Symphonie Symp. 1980 p 145-161 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23115# Beijing Univ., Shijiazhuang Hebei (China). Communications Lab.
EXPERIMENTATION WITH A SPREAD SPECTRUM MULTIPLE ACCESS COMMUNICATION SYSTEM VIA THE SYMPHONIE SATELLITE
Jiang Kanglin and Yang Tongli *In* CNES Symphonie Symp. 1980 p 179-189 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23116# Indian Space Research Organization, Ahmedabad.
DIGITAL COMMUNICATION MULTIPLE ACCESS SCHEME
Pramod Kumar and A. K. Seth (Indian Post and Telegraph of India, New Dehli) *In* CNES Symphonie Symp. 1980 p 191-201 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23117# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
THE CELTIC SYSTEM: AN EXPERIMENT WITH SYMPHONIE [SYSTEME CELTIC. EXPERIMENTATION AVEC SYMPHONIE]
D. Lombard *In* CNES Symphonie Symp. 1980 p 203-220 refs In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23118# Post and Telegraph of India, New Delhi. Telecommunications Research Centre.
SINGLE CHANNEL PER CARRIER (SCPC) SCHEME FOR REMOTE AREA TELEPHONY
R. Seshan and D. Swaminathan *In* CNES Symphonie Symp. 1980 p 221-237 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23119# Philips Telecommunication Industries, Hilversum (Netherlands).
SINGLE CHANNEL PER CARRIER (SCPC) SCHEME: DELTA MODULATION. EXPERIMENTAL RESULTS
J. C. Leguyt *In* CNES Symphonie Symp. 1980 p 239-252 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23120# AEG-Telefunken, Backnang (West Germany). Geschaeftsbereich Weitverkehr und Kabeltechnik.
SINGLE CHANNEL PER CARRIER (SCPC)-FM SYSTEM [SCPC-FM SYSTEME]
H.-P. Lier and J.-D. Buechs *In* CNES Symphonie Symp. 1980 p 253-264 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23123# Beijing Univ. (China). Dept. of Radio-Electronics.
CARRIER FREQUENCY STABILITY AND ITS EFFECT ON PHASE SHIFT KEYING SIGNALS IN THE SATELLITE CHANNEL
Liang Qinglin, Yang Tongli, and Liu Beiyian *In* CNES Symphonie Symp. 1980 p 289-299 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23124# Beijing Univ., Shijiazhuang Hebei (China). Communications Lab.
EXPERIMENTS WITH A LONG TIME DELAY PHASE-LOCKED LOOP VIA THE SATELLITE SYMPHONIE
Jiang Junzhang and Wu Longsu *In* CNES Symphonie Symp. 1980 p 301-316 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23126# Telediffusion de France, Pleumeur-Bodou.
ANALOG TELEVISION AND RADIO TRANSMISSION EXPERIMENTS [LES ESSAIS DE TRANSMISSION DE TELEVISION ANALOGIQUE ET RADIODIFFUSION SONORE]

Jacques Estivals *In* CNES Symponie Symp. 1980 p 333-341 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23127# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
EXPERIMENTAL OPERATION OF A DIGITAL VIDEO TRANSMISSION SYSTEM [VERSUCHSBETRIEB MIT EINEM SYSTEM ZUR DIGITALEN FERNSEHBILD-UEBERTRAGUNG]
Roland Burkhardt *In* CNES Symphonie Symp. 1980 p 343-353 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23128# Centre Commun d'Etudes de Television et de Telecommunications, Rennes (France).
DIGITAL TELEVISION TRANSMISSION EXPERIMENT VIA SYMPHONIE [EXPERIENCE DE TRANSMISSION DE TELEVISION NUMERIQUE PAR SYMPHONIE]
J. Ranquet *In* CNES Symphonie Symp. 1980 p 355-365 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23129# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
TESTS AND RESULTS OF INTEGRATED TV SOUND TRANSMISSION [VERSUCHE UND ERGEBNISSE MIT INTEGRIERTER FERNSEHTONUEBERTRAGUNG]
Roland Burkhardt *In* CNES Symphonie Symp. 1980 p 367-377 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23130# Post and Telegraph of India, New Delhi. Telecommunications Research Centre.
TELEVISION WITH MULTIPLE AUDIO FACILITY USING TIME DIVISION MULTIPLEXING
A. K. Seth and T. Rambilas (Indian Space Research Organization, Ahmedabad) *In* CNES Symphonie Symp. 1980 p 379-389 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23132# Norwegian Telecommunications Administration Research Establishment, Kjeller.
PROPAGATION EFFECTS IN HIGH LATITUDES
O. Osen *In* CNES Symphonie Symp. 1980 p 415-423 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23133# First Research Inst. of PTT, Shanghai (China).
SIGNAL FLUCTUATIONS OBSERVED DURING THE SYMPHONIE EXPERIMENT
Zong Ruhou, Yang Meixiao, and He Mingjun (Beijing Earth Station, China) *In* CNES Symphonie Symp. 1980 p 425-434 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23134# Centre National d'Etudes Spatiales, Toulouse (France).
TWO-WAY TIME TRANSFERS BETWEEN NATIONAL RESEARCH COUNCIL (OTTAWA) AND PARIS OBSERVATORY VIA THE SYMPHONIE SATELLITE
M. Brunet *In its* Symphonie Symp. 1980 p 435-454 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23135# National Inst. of Metrology, Beijing (China).
CLOCK SYNCHRONIZATION EXPERIMENT VIA SYMPHONIE SATELLITE
Xiao Cuiying *In* CNES Symphonie Symp. 1980 p 455-466 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23136# Shanghai Observatory (China).
A TIME COMPARISON EXPERIMENT BETWEEN SHANGAI AND PARIS VIA SYMPHONIE SATELLITE
Jiang Dongrun, Cai Jinxiang, Song Jinan (Shaanxi Observatory, China), and Zheng Hengqin (Shaanxi Observatory, China) *In* CNES Symphonie Symp. 1980 p 467-475 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23152# Deutsche Welle, Cologne (West Germany). Technische Direktion.
SATELLITE TRANSMISSION SERVING RADIO AND TELEVISION [SATELLITENUEBERTRAGUNGEN IM DIENSTE VON RUNDFUNK UND FERNSEHEN]
Heiner Hartmann *In* CNES Symphonie Symp. 1980 p 745-750 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23153# Ministere des Affaires Etrangeres, Paris (France).
SATELLITES AND COMMUNICATIONS: TRANSMISSIONS BETWEEN FRANCE AND QUEBEC VIA SYMPHONIE [SATELLITES ET COMMUNICATIONS: LES ECHANGES FRANCO-QUEBECOIS PAR SYMPHONIE]
Odile LeFranc *In* CNES Symphonie Symp. 1980 p 751-758 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23155# Ministere de l'Education Primaire et de la Television Educative, Abidjan (Ivory Coast). Programme d'Education Televisuelle.
OUTCOME OF SYMPHONIE EXPERIMENTS IN IVORY COAST [BILAN DES EXPERIMENTATIONS SYMPHONIE EN COTE D'IVOIRE]
Francis Billot-Piot *In* CNES Symphonie Symp. 1981 p 769-773 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23157# United Nations Educational, Scientific and Cultural Organization, Paris (France).
THE EXPERIMENTAL USE OF THE SYMPHONIE SATELLITE DURING THE 19TH SESSION OF THE GENERAL CONFERENCE - UNESCO
W. Seeger *In* CNES Symphonie Symp. 1980 p 787-790 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23159# Deutsches Rotes Kreuz, Bonn (West Germany). Generalsekretariat.
DISASTER RELIEF COMMUNICATIONS VIA THE SYMPHONIE SATELLITE [KATASTROPHENHILFE UEBER SATELLIT SYMPHONIE]
Wilhelm Straetmans *In* CNES Symphonie Symp. 1980 p 805-808 In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23161# Centre National d'Etudes Spatiales, Toulouse (France).
PUBLIC SERVICE. PANEL DISCUSSION D
In its Symphonie Symp. 1980 p 815-818 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23164# Nanjing Radio Factory (China).
TRANSMISSION PARAMETERS OF FDM/FM/FDMA TELEPHONE AND FM TELEVISION FOR DOMESTIC SATELLITE SYSTEM IN CHINA BASED ON THE EXPERIMENT RESULTS VIA SYMPHONIE
Wang Lihua *In* CNES Symphonie Symp. 1980 p 851-865 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23167# Direction Generale des Telecommunications, Pleumeur-Bodou (France).
THE FRENCH SATELLITE TELECOMMUNICATIONS PROGRAM: TELECOM 1 [LE PROGRAMME NATIONAL FRANCAIS DE TELECOMMUNICATIONS PAR SATELLITE TELECOM 1]
Michel Popot *In* CNES Symphonie Symp. 1980 p 901-910 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23171# Institut fuer Rundfunktechnik, Munich (West Germany).
SYMPHONIE EXPERIENCE AND SELECTION OF BROADCASTING STANDARDS FOR DIRECT BROADCASTING SATELLITE SYSTEMS [DE L'EXPERIENCE SYMPHONIE A LA DEFINITION DE NORME POUR UN SYSTEME DE RADIO DIFFUSION PAR SATELLITE]
R. Sueverkruebbe and D. PhamTat (Telediffusion de France) *In* CNES Symphonie Symp. 1980 p 947-962 In FRENCH and GERMAN (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23515# Norwegian Defence Research Establishment, Kjeller.
THE PHYSICS OF RADIO WAVE ABSORPTION
E. V. Thrane *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 15 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23535# Leicester Univ. (England). Dept. of Physics.
THE GENERATION AND PROPAGATION OF ATMOSPHERIC GRAVITY WAVES WITH SPECIAL REFERENCE TO RADIO PROPAGATION
T. B. Jones *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 14 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23537# Science Research Council, Slough (England). Rutherford and Appleton Labs.
IONOSPHERIC PREDICTIONS FOR HF RADIO SYSTEMS: THE FUTURE
P. A. Bradley and M. Lockwood *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 13 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-24002*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
FREQUENCY STANDARD TEST FACILITY DATA ACQUISITION AND PROCESSING SYSTEM
L. J. Knapp *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 22-30 (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

N81-24004*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystem Sect.
STATION STABILITY MEASUREMENT
E. N. Sosa *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 35-42 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

N81-24006*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Telecommunications Systems Sect.
ISPM X-BAND UPLINK TECHNOLOGY DEMONSTRATION. PART 1: OVERVIEW
T. A. Komarek, J. G. Meeker, and R. B. Miller *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 50-62 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 17B

N81-24012*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
NEW RESULTS ON ANTENNA ARRAYING, PART 1
L. J. Deutsch, R. L. Miller, and S. A. Butman *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 105-111 ref (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

N81-24013*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Engineering Sect.
THE 34-METER ANTENNA-SUBREFLECTOR TRANSLATIONS TO MAXIMIZE RF GAIN
M. S. Katow *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 112-120 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

N81-24015*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. TDA Mission Support Office.
RADIO FREQUENCY INTERFERENCE PROTECTION OF COMMUNICATIONS BETWEEN THE DEEP SPACE NETWORK AND DEEP SPACE FLIGHT PROJECTS
D. W. H. Johnston *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 125-131 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N81-23373 Pennsylvania Univ., Philadelphia.
FAULT ANALYSIS OF ANALOG ELECTRONIC SYSTEMS: ALGORITHMS BASED ON FUZZY SETS Ph.D. Thesis
Jonghee Lee 1980 183 p
Avail: Univ. Microfilms Order No. 8107770

Three fundamental problems are involved in achieving effective automatic generation of fault isolation tests for analog electronic systems feature extraction, fault classification, and diagnosis. Focus on dealing with the fault isolation problem involves various kinds of uncertainties such as indeterminacy or vagueness. Such problems lend themselves very well to and in fact can be solved by adopting fuzzy set concepts. This line of research produced a modified fuzzy set technique applicable to automatic fault isolation. A base line automatic isolation system is used to deal with various kinds of uncertainties. A fuzzy automation model served as a point of departure for the base line system. Various fuzzy relations are used to select and update the parameters and structures of the system. Set of algorithms and new decision criteria are implemented easily and used for effective fault isolation. A fuzzy distance measure and a fuzzy entropy measure are used for decision making in the fault isolation algorithms.
Dissert. Abstr.

N81-23374 Ohio State Univ., Columbus.
THE USE OF MICROWAVES TO CHARACTERIZE OPTICALLY STIMULATED SEMICONDUCTORS Ph.D. Thesis
Harold Kent Brown 1980 111 p
Avail: Univ. Microfilms Order No. 8107305

A theoretical model is developed describing the microwave transmission and reflection properties of semiconductor wafers after they have been illuminated with a short pulse of light from a laser. The absorption mechanism of the incident light pulse throughout the semiconductor is described giving the electron hole pair concentration as a function of position. The electron hole pair concentration during the decay process is also described as well as the microwave properties of the semiconductor as the electron hole pairs return to their equilibrium state. The theoretical model was tested experimentally using a 20 nano-second light pulse to illuminate a silicon wafer clamped between two flanges in a waveguide. The microwave energy transmitted through the wafer was measured with respect to time and the agreement with calculated values was found to be very good.
Dissert. Abstr.

N81-23375 California Univ., Santa Barbara.
ANALYSIS OF AN nn+ LOW-HIGH JUNCTION AND THE APPLICATION TO INTEGRATED INJECTION LOGIC DEVICES Ph.D. Thesis
Terry Lee Gannon 1980 182 p
Avail: Univ. Microfilms Order No. 8107688

The literature on pnn+ devices is reviewed with an itemization

of the assumptions typically made as well as a derivation of the most widely accepted theory. These assumptions are analyzed separately with the aid of sample calculations made using numerical analysis. The effects associated with heavy doping and Auger recombination are introduced with the associated theories described. A computational approach for the analysis of nn+ is developed that provides excellent agreement with the more complex and rigorous numerical analysis. The basic operation of integrated injection logic is described along with a development of a d.c. model. The a.c. or transient analysis of an integrated injection logic device using a charge control model is discussed. An extended Ebers-Moll model is described with a technique for calculating the model parameters for diffusion capacitance determination. The numerical techniques utilized in the derivations as well as determining how heavy doping and Auger effects can be incorporated into the algorithm are considered.
Dissert. Abstr.

N81-23376 Arizona Univ., Tucson.
A HIGH VOLTAGE LINEAR COMPATIBLE INTEGRATED INJECTION LOGIC (IIL) STRUCTURE: PROCESS DESIGN AND SPECIFICATIONS Ph.D. Thesis
Thomas Mariano Lalumia 1980 91 p
Avail: Univ. Microfilms Order No. 8107163

An integrated circuit processing schedule is presented that enables fabrication of both high speed I(2)L gates and high voltage linear type transistors on the same silicon starting substrate material. This process design circumvents conflicting processing requirements normally encountered in considering an I(2)L/Linear compatible structure by providing two separate epitaxial thicknesses for the I(2)L and linear section of the chip. The electrical characteristics of the I(2)L cells and the linear transistors are presented to illustrate their dependence on the doping conditions and are shown to be in contrast to each other. As a consequence of the separate epitaxial thicknesses, independence of the processing constraints is achieved. Experimental results of linear transistors and I(2)L devices fabricated using this processing schedule are presented and compared to calculated and computer simulations. Modifications to the basic process design is shown possible and enhanced performance of I(2)L devices results.
Dissert. Abstr.

N81-23377 Ohio State Univ., Columbus.
A HYBRID METHOD WHICH COMBINES A MOMENT METHOD CURRENT WITH AN ASYMPTOTIC CURRENT Ph.D. Thesis
Tae Jung Kim 1980 147 p
Avail: Univ. Microfilms Order No. 8107350

A hybrid method is presented which combines a moment method current with an asymptotic current on perfectly conducting bodies. Because the asymptotic current is asymptotic with frequency, the method works well on large bodies. The hybrid method employs the magnetic field integral equation and takes the asymptotic current to be similar to the geometrical optics current. The current in the asymptotic region, which is dominated by the optics type current on the entire surface of the scatterer, is solved by an iterative method to give the approximate surface current. The difference between the approximate and true surface currents is calculated from the moment method current, which exists near shadow boundaries and/or sharp discontinuities in geometry. Applications of this method to a wedge, square, and circular cylinders in two dimensions are considered, and also the extension of the application to three dimensional problems is presented using a sphere as an example. Dissert. Abstr.

N81-23378 Princeton Univ., N. J.
HIGH-FIELD EFFECTS IN METAL-ALUMINUM OXIDE-SILICON CAPACITORS Ph.D. Thesis
Sheau-Suey Li 1981 178 p
Avail: Univ. Microfilms Order No. 8107186

The effects of high field stress on metal-aluminum-oxide-silicon capacitors, particularly charge carrier injection into the insulator, charge carrier transport and trapping, and the events leading to dielectric breakdown are studied. The insulator was prepared by chemical vapor deposition of Al2O3 onto silicon substrates at 900 C. At comparatively low electric fields (> 2 MV/cm), electrons are injected into the oxide and are heavily trapped there. The trapping was investigated by optical photodepopulation techniques. Electron traps were found at both shallow and deep levels, predominantly in the upper half of the energy gap. The comparatively low field at which electron injection takes place rules out Fowler-Nordheim and band to band tunneling, and indicates that injection may take place through defect centers located in the insulator near the injecting interface. With negative field plate, at interface fields above approximately 4 MV/cm, laterally nonuniform positive charge appears near the Si-Al2O3 interface, due either to injection of holes from the substrate or field emission of electrons from originally neutral centers near the interface. Additional results are discussed. Dissert. Abstr.

N81-23379 Tennessee Univ., Knoxville.
METHODS AND FORMULAS FOR DETERMINING THE INTEGRAL NONLINEARITY OF SOLID-STATE AMPLIFIERS Ph.D. Thesis
Bruce Walter McNeill 1980 201 p
Avail: Univ. Microfilms Order No. 8108159

Analytical and computer simulation techniques were developed to determine the integral nonlinearity of solid state amplifiers. The three analytical techniques developed include an exact analysis and two approximations. Each of the three techniques was used to evaluate the integral nonlinearity of several single stage bipolar transistor and JFET amplifiers. In evaluating the nonlinearity of these single stage amplifiers, the exact analysis proved to be cumbersome and produced results that were difficult to evaluate. The two approximations were less cumbersome and produced results that were easier to evaluate. One of the two approximations was particularly accurate and predicted values of nonlinearity that were nearly equal, over large dynamic ranges, to the values of nonlinearity determined by the exact analysis. Two computer simulation techniques were developed for determining the closed loop nonlinearity for nonperiodic signals in negative feedback amplifiers with memory. Both of these techniques use computer time efficiently. Dissert. Abstr.

N81-23380# Delco Electronics, Santa Barbara, Calif.
THE 15kW GENERAL PURPOSE POWER CONDITIONER (FREQUENCY CHANGER), INVERTER/CONVERTER INTEGRATION Final Report
Oct. 1980 92 p
(Contract DAAK70-77-C-0157)
(AD-A097165; R80-142) Avail: NTIS HC A05/MF A01 CSCL 10/2

Contents: Introduction; Prior Contract Effort; Inverter/Converter Integration; Summary of Test Performance; Conclusions and Recommendations - Parameter 2 - Frequency Changer Input Frequency and Parameter 3 - Input Current, Parameter 13 - Short Circuit Current, Parameter 16 - No Load Losses, Parameter 17 - Efficiency at Full Load, Parameter 18 Efficiency at Rated Load, Recommendations; Appendix: Parts Lists and Diagrams.
GRA

N81-23381# Washington Univ., Seattle. Dept. of Computer Science.
A DIFFERENCE IN EFFICIENCY BETWEEN SYNCHRONOUS AND ASYNCHRONOUS SYSTEMS
Eshrat Arjomandi, Michael J. Fischer, and Nancy A. Lynch Mar. 1981 9 p refs Prepared in cooperation with Georgia Inst. of Technology, Atlanta
(Contracts N00014-80-C-0221; N00014-79-C-0873; DAAG29-79-C-0155; Grants NSF MCS-77-15628; NSF MCS-79-24370; NR Proj. 049-456)
(AD-A097476; TR-81-03-01) Avail: NTIS HC A02/MF A01 CSCL 09/3

A system of parallel processes is said to be synchronous if all processes run using the same clock, and it is asynchronous if each process has its own independent clock. For any s, n, a particular distributed problem is defined involving system behavior in n ports. This problem can be solved in time s by a synchronous system but requires time at least (s-1) log n on any asynchronous system.
Author (GRA)

N81-23382# Spire Corp., Bedford, Mass.
DEMONSTRATION OF PULSED ELECTRON BEAM APPLICATIONS (PEBA) FOR FABRICATING SMALL GEOMETRY SEMICONDUCTOR DEVICES Final Technical Report, 1 Jan. 1979 - 30 Jun. 1980

Anton Greenwald Mar. 1981 88 p refs
(Contract MDA903-79-C-0212; ARPA Order 3713)
(AD-A097547; FR-80-10065) Avail: NTIS HC A05/MF A01 CSCL 13/5

This is the final report of a program demonstrating the applicability of pulsed electron beam processing to the fabrication of small-geometry silicon semiconductor devices, with the concomitant elimination of the high-temperature thermal treatments that can degrade performance. The report documents the use of pulsed annealing techniques to fabricate diodes, ion-implanted resistors, and transistors with electrical characteristics comparable to devices fabricated by high temperature thermal processing. Pulsed liquid phase epitaxial regrowth of polysilicon films were demonstrated. Resolution with oxide masks to one micron has been shown to be feasible. Author (GRA)

N81-23383# North Carolina State Univ., Raleigh.
AN INVESTIGSTION OF THE EFFECTS OF MUTUAL COUPLING ON THE PERFORMANCE OF MICROSTRIP RADIATION Final Report, 1 Dec. 1978 - 1 Dec. 1980
James W. Mink Mar. 1981 13 p refs
(Grant DAAG29-79-G-0023)
(AD-A097556; ARO-16295.2-EL) Avail: NTIS HC A02/MF A01 CSCL 09/1

As system requirements dictate that antenna arrays achieve extremely low side lobe levels and that beam formation is well known, the effect of mutual coupling between array elements cannot be ignored. This is true even if the coupling between elements is small. At the time this investigation was initiated quantitative mutual coupling data was not available (either experimental or theoretical) for use of the microstrip array designer. Hence, one was forced to employ expensive cut-and-try techniques to achieve the final array design. The goal of this investigation was to quantitatively determine mutual coupling between microstrip radiators and to determine operating parameters of circular ring microstrip antennas which are particularly useful for microstrip array applications. To achieve the first goal a transmission line model of a pair of coupled rectangular microstrip radiators was developed. This model was then programmed on the NCSU IBM 370 computer. The model can handle two basic geometries the H-plane or parallel coupled and the E-plane or gap coupled radiators. GRA

N81-23384# Naval Research Lab., Washington, D. C. Computer Science and Systems Branch.
MINIMUM-CROSS-ENTROPY SPECTRAL ANALYSIS OF MULTIPLE SIGNALS Interim Report
R. W. Johnson and J. E. Shore 7 Apr. 1981 35 p refs
(RR0210542)
(AD-A097531; NRL-MR-4492) Avail: NTIS HC A03/MF A01 CSCL 09/4

This paper presents a new information-theoretic method for simultaneously estimating a number of power spectra when a prior estimate of each is available and new information is obtained in the form of values of the autocorrelation function of their sum. A derivation of the method from the principle of minimum cross entropy is given, and the method is compared with maximum-entropy spectral analysis and with minimum-cross-entropy spectral analysis, of which it is a generalization. Some basic mathematical properties are discussed. Two illustrative numerical examples are included, one based on synthetic spectra, and one based on actual speech data. Author (GRA)

N81-23385# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
EXTREMELY UNIFORM ELECTRODEPOSITION OF SUB-MICRON SCHOTTKY CONTACTS Interim Report
Malcolm McColl, Armond B. Chase, and Wilbur A. Garber 15 Apr. 1981 17 p refs
(Contract F04701-80-C-0081)
(AD-A097657; TR-0081(6930-04)-3; SD-81-TR-28) Avail: NTIS HC A02/MF A01 CSCL 09/1

A plating technique has been developed that yields extremely uniform metal deposits on semiconductor surfaces. This technique utilizes high field pulses that are extremely short in duration. The technique has produced theoretical Schottky barrier diode spreading resistances for contacts with dimensions ranging from 2.5 to 0.12 micron in diameter. GRA

N81-23386# Illinois Univ. at Urbana. Coordinated Science Lab.
TERMINATION OF SURFACE ACOUSTIC WAVE VELOCITY AND IMPEDANCE DIFFERENCES BETWEEN METAL STRIPS AND FREE SURFACE REGIONS OF METALLIC GRATINGS Interim Report
B. J. Hunsinger and S. Datta Feb. 1981 79 p refs
(Contract F19628-78-C-0040; AF Proj. 2305)
(AD-A097337; RADC-TR-81-4) Avail: NTIS HC A05/MF A01 CSCL 09/3

This interim report describes the scattering theory approach for calculating the shift in velocity and acoustic reflection caused by one electrode (which can be buried) in an infinite array. Piezoelectric loading as well as first and second order mechanical loading are considered. The results calculated from electrode geometry and material constants are presented in the form of scatter matrices from which transmission line model parameters are derived. The analysis is being extended to the finite array case and these results will be included in the final report. Author (GRA)

N81-23387# TRW Defense and Space Systems Group, Redondo Beach, Calif.
THE 403 MHz SAW OSCILLATOR Interim Report, 5 May - 10 Nov. 1980
D. J. Dodson Fort Monmouth, N.J. Army Electronics Research and Development Command Mar. 1981 91 p
(Contract DAAK20-80-C-0260)
(AD-A097675; DELET-TR-80-0260-1; IR-1) Avail: NTIS HC A05/MF A01 CSCL 09/5

This contract provides for a twelve month program for the investigation and exploratory development of a 200 mW, SAW stabilized oscillator which can be frequency and amplitude modulated. The oscillator is to have its center frequency at 403 MHz and be tunable over a + or - 3 MHz bandwidth. Trade-off design studies have been performed to determine techniques which will provide the most effective interaction of essential oscillator components, i.e., SAW delay-line, phase shifter, coupler and amplifier, to provide a high degree of frequency stability. A significant effort was made to implement the required circuit functions in a low-cost printed circuit approach rather than utilize high-cost commercially available components, since the oscillator is intended for use in an expendable application. Specific tasks addressed to date include: Mask and SAW delay line design and fabrication. Assembly of a dc circuit board as required for electronic tuning, modulation, compensation and regulation. Integration and test of a complete breadboard oscillator. Extensive circuit characterization. GRA

N81-23388# Texas Univ. at Arlington. Dept. of Electrical Engineering.
QUASI-OPTICAL TECHNIQUES FOR MILLIMETER AND SUBMILLIMETER-WAVE CIRCUITS Final Report, 1 Jul. 1978 - 31 Jan. 1981
Tatsuo Itoh 25 Mar. 1981 57 p refs
(Contract DAAG29-78-G-0145)
(AD-A097355; ARO-16171.17-EL) Avail: NTIS HC A04/MF A01 CSCL 09/3

This report summarizes research activities at the Microwave Laboratory, University of Texas on various structures for millimeter-wave and submillimeter-wave circuits under sponsorship of US Army Research Office Grant DAAG29-78-G-0145. The topics of investigation include distributed feedback oscillators, distributed gain mechanisms, trapped image guides and leaky wave antennas, monolithic detectors, excitation of dielectric waveguides, printed lines and printed radiating structures. A list of publications is included. Author (GRA)

N81-23389# Minnesota Univ., Minneapolis. Dept. of Electrical Engineering.
A STUDY OF FLICKER NOISE IN MOSFETS Final Report, 16 Mar. 1980 - 15 Mar. 1981
A. VanDerZiel Mar. 1981 9 p refs
(Contract DAAG29-79-C-0078)
(AD-A097557; ARO-16441.7-EL) Avail: NTIS HC A02/MF A01 CSCL 09/1

Temperature fluctuations, i/f and g-r noise has been measured and empirically modeled in thin pyroelectric films, in P-implanted

buried-channel and weakly inverted MOSFETs. Number and mobility fluctuation models are being used. Reference is made to papers published or in print. Author (GRA)

N81-23390# Michigan Univ., Ann Arbor. Electron Physics Lab.

CONTROLLED AVALANCHE TRANSIT-TIME TRIODE AMPLIFIERS Interim Technical Report, Jul. 1977 - Jul. 1980

Shiu-Wuu Lee Nov. 1980 220 p refs

(Contract F33615-77-C-1132; AF Proj. 2002)

(AD-A097439; TR-145; AFWAL-TR-80-1185) Avail: NTIS HC A10/MF A01 CSCL 09/1

The purpose of this work is to study the theoretical effects of avalanche multiplication and collector transit time on microwave controlled avalanche transit-time triode (CATT) devices. The objectives of this report are to obtain a better device model, develop a complete one-dimensional large-signal simulation computer program, calculate the large-signal performance of Class C CATT amplifiers and make a comparison between Class C CATT and Class C BJT amplifiers. GRA

N81-23391# Adaptive Optics Associates, Inc., Cambridge, Mass.

ADVANCED WAVEFRONT SENSOR CONCEPTS Final Technical Report, Jan. - Sep. 1980

J. K. Bowker, J. Feinleib, L. Schmutz, M. Shao, and S. J. Tubbs Jan. 1981 190 p refs

(Contract F30602-80-C-0063; AF Proj. 4506)

(AD-A097187; RADC-TR-80-368) Avail: NTIS HC A09/MF A01 CSCL 17/8

The objective of this effort was to investigate advances in wavefront sensor technology for use in future adaptive optics systems. The improvements sought over presently developed adaptive optics systems are preliminary in the areas of component efficiency and sub-system complexity, since this would have potential for major operational simplicity and reduced cost. The concept under study in this effort is the Large Scale Integrated Imaging Irradiance (LSI3) sensor. This is based on the Integrated Imaging Irradiance (I3) sensor (U.S. Patent No. 4,141,652). The I3 sensor is based on the Hartmann concepts, but does not suffer from the optical alignment problems inherent to previously developed Hartmann sensors. Another of the major advantages of the LSI3 sensor over the Hartmann sensors (including the previously developed I3 sensor) is that the LSI3 sensor utilizes the full aperture of the system in dividing the input photon flux into the respective quadrants which results in better diffraction - limited resolution. The LSI3 sensor is based on an optical system that is independent of the number of sub-apertures selected. The major tasks of this study included the conceptual design of a small version (approximately 20 channels), a large scale (approximately 200 channels) wavefront sensor, and the evaluation of the expected performance, complexity, and cost of these prototype models. The result of these design advancements is a new wavefront sensor (LSI3) which could provide cost and performance advances for future adaptive optics systems. GRA

N81-23392# Westinghouse Electric Corp., Lester, Pa. Power Generation Div.

THE 100 MWe OTEC ALTERNATE POWER SYSTEMS. VOLUME 2: APPENDICES Final Report

5 Mar. 1979 301 p refs

(Contracts EG-77-C-05-1473; EG-77-C-03-1473)

(ORO-1473-T1-Vol-2-1) Avail: NTIS HC A14/MF A01

Information is presented on the design and dynamic behavior of the platform and cold water pipe, construction and sizing, anchoring, maintenance, and cost. The equations used to calculate nonequilibrium allowance in flash evaporators and the design and performance of the electric generator and exciter for the power system are included. Brief descriptions of the computer programs used in the design and analyses are also included. DOE

N81-23393# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

ELECTRIC UTILITY VALUE DETERMINATION FOR WIND ENERGY. VOLUME 1: A METHODOLOGY

C. David Percival and James R. Harper Feb. 1981 89 p refs

(Contract EG-77-C-01-4042)

(SERI/TR-732-604-Vol-1) Avail: NTIS HC A05/MF A01

A method electric utilities can use to determine the value of wind energy systems is described. It is performed by a package of computer models that can be used with most utility planning models. The final output of these models gives a financial value ($/kW) of the wind energy system under consideration in the specific utility system. This report, the first of two volumes, describes the value determination method and gives detailed discussion on each computer program available. DOE

N81-23394# Midwest Research Inst., Golden, Colo. Utility Applications and Policy Branch.

ELECTRIC UTILITY VALUE DETERMINATION FOR WIND ENERGY. VOLUME 2: A USER'S GUIDE

C. David Percival and James R. Harper Feb. 1981 115 p

(Contract EG-77-C-01-4042)

(SERI/TR-732-604-Vol-2) Avail: NTIS HC A06/MF A01

A method for determining the value of wind energy systems to electric utilities is described. It is performed by a package of computer models available from SERI that can be used with most utility planning models. The final output of these models gives a financial value ($/kW) of the wind energy system under consideration in the specific utility system. This is a user's guide for the computer programs available from SERI. DOE

N81-23395# Flow Research, Inc., Kent, Wash.

ADVANCED ELECTRODE DESIGN FOR ELECTROSTATIC PRECIPITATORS

S. Berstein, K. Ushimaru, and E. W. Geller 1980 10 p refs

(Contract DE-AC03-81EV-10506)

(DOE/EV-10506/T1) Avail: NTIS HC A02/MF A01

The wavy electrode precipitator incorporates a contoured collecting electrode geometry which produces a nearly uniform electric field along the electrode. This feature allows operation with higher average electric field strengths near the electrode than in conventional designs. The wavy electrode provides separated flow zones within its valleys, which fluid dynamically shield particles from the main stream. The design also provides mechanical rigidity to vertical bending without the sharp flanges normal to the flow commonly found in conventional precipitators. These features permit increased performance for all particle sizes, but especially help in the precipitation of the fine particles which are normally the most difficult to collect. DOE

N81-23396# Electric Power Research Inst., Palo Alto, Calif. Transmission Dept.

WORKSHOP OF ARC BY-PRODUCTS IN GAS INSULATED EQUIPMENT Final Report

V. H. Tahiliani and Paul Vouros Dec. 1980 59 p Workshop held in Chicago, 4-5 Jun. 1980

(EPRI-EL-80-8-LD; TPS79-234) Avail: NTIS HC A04/MF A01

A chemical data base was developed on the generation of arc by-products in gas insulated type equipment. Various aspects of arc induced decomposition of SF6, such as identification and quantitation of by-products, mechanisms of their formation and analytical methods used for their determination were reviewed. Users were made aware of the type of arc by-products encountered in SF6 insulated equipment, and to solicit their input with regard to the direction of any future work. DOE

N81-23397# Electric Power Research Inst., Palo Alto, Calif. Safety and Analysis Dept.

IMPACT OF OPERATIONAL EXPERIENCE ON RESEARCH AND DEVELOPMENT

Walter B. Loewenstein and Achilles G. Adamantiades Jan. 1981 23 p refs

(EPRI-NP-1689-SR) Avail: NTIS HC A02/MF A01

The gradual accumulation of operating experience data from nuclear plants is having a perceptible impact on the direction of research and development. Four areas where this influence is best manifested are identified: increased awareness of systems interaction, the importance of operational data for code qualification, a sharper focus of separate effects, and the importance of well-defined scaled experiments. Illustrations from EPRI-sponsored and EPRI-conducted projects are presented. DOE

N81-23398# Ames Lab., Iowa. Solid State Physics Dept.
THEORY OF FLUX-FLOW VOLTAGE NOISE IN TYPE II SUPERCONDUCTORS Ph.D. Thesis
Peter Shuk-Yu Li Feb. 1981 130 p refs
(Contract W-7405-eng-82)
(IS-T-935) Avail: NTIS HC A07/MF A01

A theory for the flux-flow voltage noise in a type-II superconductor in the mixed state is developed. The interactions between the vortices are taken into account via a wavevector dependent interaction matrix. Applied to Johnson noise in a film without flux flow for a special measuring circuit, the theory predicts a suppression of the power spectrum at low frequencies. For flux-flow noise produced when a perfect vortex lattice moves in a superconducting foil or film containing a random array of independent pinning centers, the theory gives two contributions to the power spectrum: one from tranverse velocity fluctuations, which has a characteristic frequency determined by the characteristic frequency of the power spectrum of the elementary pinning force; the other from longitudinal density fluctuations, which may have a characteristic frequency determined by the elastic constants and the geometry of the measuring circuit. Both of these frequencies are much higher than experimentally observed values. DOE

N81-23399# Sandia Labs., Albuquerque, N. Mex. Exploratory Batteries Div.
EXPERIMENTAL INVESTIGATIONS OF CERTAIN SIDE REACTIONS AND THE INITIAL VOLTAGE TRANSIENT FOR FeS2 CATHODES IN THERMAL BATTERIES
Jimmie Q. Searcy, Frank M. Delnick, and Joseph C. DAngelo Feb. 1981 16 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-2341) Avail: NTIS HC A02/MF A01

Phenomena contributing to the initial voltage transient observed in thermal batteries which use FeS2 for the cathode material are examined. These phenomena are: (1) a thermodynamic increase in the potential caused by the initial temperature peak which results from the heat pellets when ignited; (2) electrochemical participation of surface contaminants on the FeS2; (3) electrochemical reduction of oxygen or reaction products of oxygen with FeS2; (4) electrochemical reduction of elemental sulfur produced by the thermal decomposition of FeS2; and (5) the voltage decrease which accompanies the saturation of the electrolyte with the electrochemical phenomena include performing single cell tests under an inert atmosphere, using a nonreactive material for current collectors, using an additive with the cathode to suppress the initial voltage transient, and predischarging the cathodes. DOE

N81-23400# National Bureau of Standards, Washington, D.C. National Engineering Lab.
CALCULATED OPERATING TEMPERATURES OF THERMALLY INSULATED ELECTRIC CABLES Final Report
David D. Evans Jan. 1981 41 p refs Sponsored in part by Consumer Product Safety Commission
(PB81-145781; NBS-TN-1133) Avail: NTIS HC A03/MF A01 CSCL 13L

Steady state operating temperatures of current-carrying electric cables buried axially in cylinders of thermal insulation were calculated. Combinations of six types of nonmetallic electric cable, two thermal insulation materials, five thermal insulation thicknesses and a range of currents both greater and less than the typical rated service currents for the cables were studied. These calculations show that thermally insulated electric cables carrying the rated current may exceed the rated operating temperature limit for common cable jacket materials. GRA

N81-23401# Spire Corp., Bedford, Mass.
SEMICONDUCTOR PROCESSING BY ELECTRON BEAM PULSE-INDUCED SURFACE REACTIONS Final Report, 1 Oct. 1979 - 31 Mar. 1980
A. R. Kirkpatrick 1 Apr. 1980 39 p
(Grant NSF DAR-79-17715)
(PB81-148579; FR-60023; NSF/RA-800309) Avail: NTIS HC A03/MF A01 CSCL 09A

The feasibility of complete low temperature processing of advanced semiconductor devices using energy beams and associated inducted surface reaction was established. Two cases of low temperature beam processing was investigated: (1) dopant introduction from surface sources; and (2) formation of grown oxides and nitrates. Excellent results were obtained. In the case of dopant introduction from surface sources by means of energy pulse induced redistribution, candidate procedures resulted in doped layers which could be considered for actual device utilization. Results achieved relative to low temperature formation of grown oxides and nitrides on silicon appear promising. Stoichiometrically correct SiO2 and Si3N4 layers of high quality and thickness up to 0.2 micrometers were achieved. GRA

N81-23121# Post and Telegraph of India, New Delhi. Telecommunication Research Centre.
INTEGRATION OF SATELLITE CIRCUITS IN THE TERRESTRIAL TELECOMMUNICATION NETWORK
S. Satagopan *In* CNES Symphonie Symp. 1980 p 265-279 refs (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23162# AEG-Telefunken, Ulm (West Germany).
THE TRAVELLING WAVE TUBE TL 4003 AND FURTHER DEVELOPMENT OF TWT [DIE WANDERFELDROEHRE TL 4003 UND DIE WEITEREN ENTWICKLUNGEN VON SATELLITENWANDERFELDROEHREN]
Jork Bretting *In* CNES Symphonie Symp. 1980 p 819-833 In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-24003*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
A FOUR-WAY DISTRIBUTION AMPLIFIER FOR REFERENCE SIGNAL DISTRIBUTION
Y. V. Lo *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 31-34 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 09A

N81-24007*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
END-TO-END QUALITY MEASURE FOR TRANSMISSION OF COMPRESSED IMAGERY OVER A NOISY CODED CHANNEL
V. N. Korwar and P. J. Lee *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 63-72 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 09C

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N81-23402 Oregon State Univ., Corvallis.
FLUID FORCES ON SMOOTH AND ROUGH CIRCULAR CYLINDERS Ph.D. Thesis
Cheng-Wen Lin 1981 210 p
Avail: Univ. Microfilms Order No. 8108206

Forces on cylinders from some steady and unsteady flows in the drag/inertia regime are considered as well as the influence from heavy accumulations of marine growths. A matrix form of the Morison equation for cylinders which are oriented arbitrarily with respect to the oncoming flows is examined for use in practical situations. The statistical characteristics of the forces can be utilized for determining the probability distributions. An equivalent diameter coefficient, delta, is proposed as well as C sub d and C sub m to describe the effect from heavy marine growths. A method of analyzing these coefficients, as well as the lift coefficient, C sub L, are presented for determination from the second order Morison equation. A laboratory study utilizing the smooth cylinder Strouhal number of 0.20 was made to obtain delta for smooth and roughened cylinders in a flow

visualization flume and in the OSU wind tunnel. Spectrum analysis of the wind forces showed that transverse forces from vortex shedding were centered around the shedding frequency and that in-line forces had little influence from vortex shedding.
Dissert. Abstr.

N81-23403 Wisconsin Univ. - Madison.
OPTIMUM DESIGN OF UNTETHERED WAVE ENERGY GENERATION SYSTEMS Ph.D. Thesis
Abuelela Mohammed Abuelnaga 1980 420 p
Avail: Univ. Microfilms Order No. 8105256

The development of a self supporting wave energy generation system is described. The system consists of a buoy supported on a platform which is self-stabilized in the vertical direction and dynamically positioned in the horizontal plane. Design graphs and computer programs are developed for optimizing the performance of such systems with respect to a weighted combination of conversion efficiency and platform heave motion. Two and three mass systems are optimized and their relative merits are discussed. A control scheme based on changing the load damping is developed to optimize the system performance for the expected wave conditions. A full scale diagrammatic representation of the proposed optimal system is given where the energy conversion is accomplished by means of a hydraulic power circuit. The developed procedure can be readily applied for the optimum design of the support systems for data gathering buoys and other floating structures. Dissert. Abstr.

N81-23404 Wayne State Univ., Detroit, Mich.
RHEOLOGY, FLOW AND ATOMIZATION OF COAL-OIL MIXTURES Ph.D. Thesis
Mohammad Reza Ghassemzadeh 1980 192 p
Avail: Univ. Microfilms Order No. 8107205

Samples of stable coal oil slurries have been prepared, with coal concentrations ranging from 30-50% by weight. Extensive rheological data was obtained using capillary and cone-plate viscometers for samples of coal-oil mixtures and number 6 fuel oil which served as a reference fluid. Viscosity measurements show coal oil mixtures to be shear thinning suspensions, i.e., the viscosity decreases moderately with increasing shear rates. At the concentration range of 30-40% coal, the slurry shows a predominantly Newtonian behavior. For slurries with coal concentrations higher than 40% yield point was observed. The study of these samples of coal oil slurries with the rotating rod viscometer indicates migration of coal particles away from the rotating rod with no noticable rod climbing, thus no evidence of normal stress effects. Pipe flow tests were carried out to study the effect of Carboxymethylcellulose on drag reduction of flow of coal oil mixtures. Dissert. Abstr.

N81-23405 Utah Univ., Salt Lake City.
A THEORETICAL STUDY OF TURBULENCE IN TERMS OF CONDITIONED VARIABLES Ph.D. Thesis
Myung-Jae Lee 1980 161 p
Avail: Univ. Microfilms Order No. 8106872

A technique known as conditioned sampling and averaging is discussed in detail and some definitions in this technique are broadened. By introducing intermittency function into the conventional equations of the motion, conditioned equations are derived. Because of the intermittency function in the equations, the conditioned equations have more complicated forms and more terms than the corresponding unconditioned equations. Consequently, there are more terms to be modeled than in the conventional equations. The conditioned equations are for the description of the turbulent zone only. Dissert. Abstr.

N81-23406 Ohio State Univ., Columbus.
COMBINED RADIATION AND CONDUCTION IN A NONGRAY PARTICIPATING MEDIUM THAT ABSORBS, EMITS, AND ANISOTROPICALLY SCATTERS Ph.D. Thesis
Robert Lee Houston 1980 148 p
Avail: Univ. Microfilms Order No. 8107342

Heat transfer by radiation and conduction through a fiberglass insulation placed between two opaque, isothermal walls, was theoretically predicted. The method of solution utilizes a solution of Maxwell's equations to describe the interaction of electromagnetic radiation with the glass fibers. It incorporates measured spectral optical constants as well as the fiber sizes and orientations to predict the scattering and absorption coefficients and the phase functions needed to solve the radiative transport equation. The coupling of radiation and conduction required an iterative solution of the energy equation and the discrete ordinate approximation to the equation of radiative transfer. It is shown that radiation and conduction are each responsible for about one half of the total heat transfer and this coupling induces, in general, a nonlinear temperature profile. Of the radiation, about one half occurs at wavelengths less than 8 micrometers because of the nongray optical properties of glass. The theoretical prediction of the total heat flux is in excellent agreement with available laboratory measurements.
Dissert. Abstr.

N81-23407 Oregon State Univ., Corvallis.
EXPERIMENTAL STUDIES OF PARTIALLY DEFLUIDIZED BED WITH IMMERSED HEAT EXCHANGE TUBES Ph.D. Thesis
Norkun Sitthiphong 1981 169 p
Avail: Univ. Microfilms Order No. 8108213

Bed slumping in a partially fluidized bed combustor is modeled in a cold phase fluidized bed. Correlations describing the changing contours of the slumped bed surface are presented. A simple model developed to predict the motions of ejected particles from the active side to the defluidized side of the bed. A method for determining the total amount of bed material transfer at any defluidization time is presented. The effect of superficial velocity on the percentage of gas bypass through the slumped section, on refluidization after a long period of defluidization, on the lateral dispersion coefficient of solids, and on the rate of solids mixing are reported. Results from the model bed were converted to the high temperature case and compared with available data, indicating good agreement of model results with actual data.
Dissert. Abstr.

N81-23408 State Univ. of New York at Stony Brook.
MICROSCOPIC APPROACH TO TRANSPORT IN TWO-PHASE RANDOM MEDIA Ph.D. Thesis
Salvatore Torquato 1980 296 p
Avail: Univ. Microfilms Order No. 8105915

General and exact methods of characterizing the microscopic structure of a two phase medium with random structure are described through use of certain statistical quantities n point void probability functions and n body distribution functions, in particular. Assuming the particles of the two phase medium are at thermal equilibrium, a general formalism is developed that allows one to express the n point functions, for any n, in terms of the n body distribution functions of equilibrium statistical mechanics. A certain subset of the n point void functions for media of suspensions or beds of impenetrable or fully penetrable spheres of equal radius is examined. The two point void function is accurately evaluated for a system of impenetrable spheres over a wide range of sphere densities. The conditions under which the Mayer-Montroll and Kirkwood-Salsburg hierarchies for a binary mixture map into relations among the aforementioned n point functions are examined. An exact relationship is derived between the effective transport property associated with those processes in which the flux is a divergence-free vector and the gradient, or force, is a curl-free vector (e.g., conductivity), and the statistics of the media. Dissert. Abstr.

N81-23409 Illinois Univ. at Chicago Circle, Chicago.
EXPERIMENTAL AND THEORETICAL INVESTIGATION OF DROPLET DEPOSITION AND HEAT TRANSFER IN AIR-WATER DISPERSED FLOW Ph.D. Thesis
Kandula Mastanaiah 1980 198 p
Avail: Univ. Microfilms Order No. 8106856

An experimental and theoretical investigation of liquid droplet deposition and heat transfer in turbulent air-water dispersed flow was carried out. The experimental test facility was comprised of two vertical test sections; one is an adiabatic acrylic tube 12.7 mm I.D. and 889 mm long used for the deposition study; and the other is a heat transfer test section which is a stainless steel tube 12.94 mm I.D., 889 mm long and heated directly electrically. A physical model was proposed for the deposition motion of large sized particles suspended in a turbulent gas stream. It was shown that the principal resistance to the

transport of large particles is governed by their dispersion in the turbulent core. Dissert. Abstr.

N81-23410*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MEAN-FLOW AND TURBULENCE MEASUREMENTS IN THE VICINITY OF THE TRAILING EDGE OF AN NACA (63 SUB 1)-012 AIRFOIL

James C. Yu Washington May 1981 45 p refs

(NASA-TP-1845; L-13959) Avail: NTIS HC A03/MF A01 CSCL 20D

The Langley aircraft noise reduction laboratory was used to measure mean flow and turbulence in the vicinity of a cusped-trailing edge of two dimensional NACA 631-012 airfoil at zero angle of attack. Naturally transitioned flow and artificially tripped flow were investigated. Flow regions studied include the boundary layer and the near wake. Measurements were made at a free stream Reynolds number based on airfoil chord of 1.25 x 10 to the 6th power and a free stream Mach number of 0.1. Distributions of streamwise mean velocity, integral properties of the mean flow, turbulent intensities, and Reynolds shear stress are reported. For the naturally transitioned flow, the general trends observed are similar to those reported for a fully developed turbulent boundary layer over a flat plate under zero pressure gradient, with the exception of the notable streamwise variations in the turbulence properties for the airfoil flow. The main effect of flow tripping is to eliminate these streamwise variations. Observed changes in the mean flow and turbulence fields caused by tripping are expected on the basis of the Reynolds number based on the boundary layer thickness. A.R.H.

N81-23411*# Science Applications, Inc., Canoga Park, Calif. Dept. of Combustion Science and Advanced Technology.

MULTIPLE-SCALE TURBULENCE MODELING OF BOUNDARY LAYER FLOWS FOR SCRAMJET APPLICATIONS

G. Fabris, P. T. Harsha, and R. B. Edelman Washington NASA May 1981 74 p refs

(Contract NAS1-15988)

(NASA-CR-3433; SAI-80-022-CP) Avail: NTIS HC A04/MF A01 CSCL 20D

As part of an investigation into the application of turbulence models to the computation of flows in advanced scramjet combustors, the multiple-scale turbulence model was applied to a variety of flowfield predictions. The model appears to have a potential for improved predictions in a variety of areas relevant to combustor problems. This potential exists because of the partition of the turbulence energy spectrum that is the major feature of the model and which allows the turbulence energy dissipation rate to be out of phase with turbulent energy production. The computations were made using a consistent method of generating experimentally unavailable initial conditions. An appreciable overall improvement in the generality of the predictions is observed, as compared to those of the basic two-equation turbulence model. A Mach number-related correction is found to be necessary to satisfactorily predict the spreading rate of the supersonic jet and mixing layer. S.F.

N81-23412# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

MEASURING SKIN FRICTION WITH PRESTON TUBES IN BOUNDARY-LAYER FLOWS WITH ADDITIONAL PARAMETERS

Wolfgang Nitsche 1981 18 p refs Transl. into ENGLISH from Zeitschrift fuer Flugwissenschaft und Weltraumforschung 4 (3), 1980 p 142-147 Prepared for Technical Univ. of Berlin (ISSN-0077-5606) Avail: NTIS HC A02/MF A01

For determining local skin friction forces near a wall, a surface pitot technique based on the Preston tube method is presented which allows the experimental determination of wall shear stress in boundary layers even when additional parameters are introduced such as an adverse pressure gradient, wall roughness, and heat transfer. The technique is based on the mathematical treatment of stagnation pressure at the Preston tube and allows the computation of calibration curves and the determination of skin friction by means of iteration from known wall laws taking into account the appropriate boundary layer similarity parameters. The technique was experimentally checked in a rough pipe, an intensively heated or cooled flat plate, and with a flat plate erected with adverse pressure gradient. E.D.K.

N81-23413*# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Physics.

KINETIC THEORY AND TURBULENT DISCONTINUITIES Final Report, 1 Jun. 1979 - 31 May 1980

Joseph A. Johnson, III, Lin I, Yuan Li, Raghu Ramaian, and Jaime P. Santigo 15 May 1981 37 p refs

(Grant NsG-3280)

(NASA-CR-164287) Avail: NTIS HC A03/MF A01 CSCL 20D

Shock tube discontinuities were used to test and extend a kinetic theory of turbulence. In shock wave and contact surface fluctuations, coherent phenomena were found which provide new support for the microscopic nonempirical approach to turbulent systems, especially those with boundary layer-like instabilities. Author

N81-23414*# Cambridge Hydrodynamics, Inc., Mass.

STUDIES OF COMPRESSIBLE SHEAR FLOWS AND TURBULENT DRAG REDUCTION Final Report

Steven A. Orszag Apr. 1981 63 p refs

(Contract NAS1-15844)

(NASA-CR-165690; CHI-49) Avail: NTIS HC A04/MF A01 CSCL 20D

Compressible shear flows and drag reduction were examined and three methods are addressed: (1) the analytical and numerical aspects of conformal mapping were summarized and a new method for computation of these maps is presented; (2) the computer code SPECFD for solution of the three dimensional time dependent Navier-Stokes equations for compressible flow on the CYBER 203 computer is described; (3) results of two equation turbulence modeling of turbulent flow over wavy walls are presented. A modified Jones-Launder model is used in two dimensional spectral code for flow in general wavy geometries. E.A.K.

N81-23415*# Princeton Univ., N. J. Gas Dynamics Lab.

COMPRESSIBLE TURBULENT BOUNDARY LAYER INTERACTION EXPERIMENTS Final Technical Report, 1 Feb. 1978 - 31 Jan. 1981

Gary S. Settles and Seymour M. Bogdonoff May 1981 37 p refs

(Grant NsG-2299; Contracts F44620-75-C-0080; F49620-80-C-0092)

(NASA-CR-164292; MAE-1525) Avail: NTIS HC A03/MF A01 CSCL 20D

Four phases of research results are reported: (1) experiments on the compressible turbulent boundary layer flow in a streamwise corner; (2) the two dimensional (2D) interaction of incident shock waves with a compressible turbulent boundary layer; (3) three dimensional (3D) shock/boundary layer interactions; and (4) cooperative experiments at Princeton and numerical computations at NASA-Ames. S.F.

N81-23416*# Pennsylvania State Univ., State College. Applied Research Lab.

THE BOUNDARY LAYER ON COMPRESSOR CASCADE BLADES Semiannual Progress Report, 1 Dec. 1980 - 1 Jun. 1981

Steven Deutsch 1 Jun. 1981 8 p refs

(Grant NsG-3264)

(NASA-CR-164330) Avail: NTIS HC A02/MF A01 CSCL 20D

The flow field about an airfoil in cascade at a Reynolds number of 5 x 10 to the 5th power is described. Hot wire and laser anemometry are combined with flow visualization techniques in order to obtain detailed flow data (e.g., boundary layer profiles, points of separation, and the transition zone) on a cascade of relatively highly loaded blades. Benchmark data is provided for the evaluation of current and future predictive models, in this way aiding in the compressor design process. R.C.T.

N81-23417*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PROLONGING THERMAL BARRIER COATED SPECIMEN LIFE BY THERMAL CYCLE MANAGEMENT

Robert C. Hendricks, G. McDonald, and Nicholas P. Poolos (Harvard Univ.) 1981 12 p refs Presented at the Intern. Conf. on Met. Coatings, San Francisco, 6-10 Apr. 1981; sponsored by the Am. Vacuum Soc.
(NASA-TM-81742; E-795) Avail: NTIS HC A02/MF A01 CSCL 20D

Measurements were made of the rate of increase in temperature of a ZrO2-8Y2O3 thermal barrier coated (TBC) specimen for various values of fuel/air (F/A) ratios when the specimen is exposed to a 0.3 Mach burner flame. For rod specimens in a carousel, the heating rates increased with (F/A) ratio and were higher at the inward facing surface for a given (F/A). Plate specimens were more sensitive to burner variations. Calculated results are given for the radial stress in the coated rod specimens for variations in (F/A) ratios from 0.04 to 0.065. Over this range, the radial stress varies from 4.3 to 5.3 MPa. The results indicate that controlling the heating rate of a TBC by controlling the (F/A) ratio offers a potential method to prolong TBC cyclic life; uncontrolled (F/A) ratios will produce scatter in experimental results. Geometric arrangement can have an equivalent effect, but is usually fixed by design. R.C.T.

N81-23418*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ASSESSMENT OF VARIATIONS IN THERMAL CYCLE LIFE DATA OF THERMAL BARRIER COATED RODS
Robert C. Hendricks and G. McDonald 1981 13 p refs Presented at the Intern. Conf. on Met. Coatings, San Francisco, 6-10 Apr. 1981; sponsored by the Am. Vacuum Soc.
(NASA-TM-81743; E-796) Avail: NTIS HC A02/MF A01 CSCL 20D

An analysis of thermal cycle life data for 22 thermal barrier coated (TBC) specimens was conducted. The ZrO2-8Y2O3/NiCrAlY plasma spray coated Rene 41 rods were tested in a Mach 0.3 Jet A/air burner flame. All specimens were subjected to the same coating and subsequent test procedures in an effort to control three parametric groups; material properties, geometry and heat flux. Statistically, the data sample space had a mean of 1330 cycles with a standard deviation of 520 cycles. The data were described by normal or log-normal distributions, but other models could also apply; the sample size must be increased to clearly delineate a statistical failure model. The statistical methods were also applied to adhesive/cohesive strength data for 20 TBC discs of the same composition, with similar results. The sample space had a mean of 9 MPa with a standard deviation of 4.2 MPa. R.C.T.

N81-23419# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
MULTINOZZLE PLUME FLOWFIELDS Final Report, 1 Oct. 1975 - 15 Oct. 1980
Stanley Rudman 1981 171 p refs
(Contract F44620-76-C-0021; AF Proj. 2308)
(AD-A097244; RE-618; AFOSR-81-0307TR) Avail: NTIS HC A08/MF A01 CSCL 20/4

The a priori prediction of multinozzle rocket exhaust flow fields is addressed in detail. The requirements for accurate prediction of plume signature are derived and new quantitative relationships between optical signal and plume properties are derived. It is shown that, among a variety of requirements, plume models must include an accurate detailed description of the three dimensional near field of the multinozzle plume self impingement to achieve accuracy and reliability. The qualitative structure of these complex three dimensional flow fields is discussed. Several of the regulating flow process thus identified are three-dimensional in nature and have no counterparts in classical two-dimensional supersonic flow theory. One such process, the intersection of two three-dimensional shock surfaces, is analyzed in detail and a qualitative account of the developing pattern is given. A three-dimensional 'floating fitted shock' numerical technique was devised for the first time. The computer code employs discrete discontinuities including plume boundary, shock surface and a Complex singularity all which propagate through a fixed computational grid. The code was used successfully for the computation of the impingement of two uniform rectangular jets. A new analysis for the Mach disc flow field in an axisymmetric plume was derived. GRA

N81-23420# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
AN EXPERIMENTAL AND NUMERICAL COMPARISON OF TURBULENT FLOW OVER A STEP Interim Technical Report, Jun. 1978 - Jul. 1980
Robin J. Bremmer, H. Doyle Thompson, and Warren H. Stevenson Dec. 1980 157 p refs
(Contract F33615-77-C-2010; AF Proj. 2308)
(AD-A097141; AFWAL-TR-80-2108) Avail: NTIS HC A08/MF A01 CSCL 20/4

An experimental investigation was made of air flow in a four inch square duct over a single four inch high rearward-facing step. The Reynolds number based on step height was 1.68 x 100,000 and the boundary layer approaching the step was turbulent. The pressure coefficient (Cp) distribution was found to be in relatively good agreement with similar measurements published in the literature. A laser Doppler velocimeter was used to measure an ensemble of 4500 individual velocities at angles of 0 deg, + 30 deg, and -30 deg to the duct axis from which the following mean velocities and turbulence parameters at 180 points in the flow field were derived. The results, in general, compare favorably with those found in the literature. A two-dimensional numerical prediction of the flow field was made using the k approx epsilon turbulence model. The comparison with the experimental results illustrates the three-dimensionality of the flow. GRA

N81-23421# California Univ., Berkeley. Dept. of Mechanical Engineering.
TURBULENT FLOW AND HEAT TRANSFER IN PASSAGE AROUND 180 DEGREE BEND: AN EXPERIMENTAL AND NUMERICAL STUDY Annual Summary Report, 1 Oct. 1979 - 30 Sep. 1980
Joseph A. C. Humphrey and Brian E. Launder (Manchester Univ., England) Feb. 1981 198 p refs
(Contract N00014-80-C-0031)
(AD-A097461) Avail: NTIS HC A09/MF A01 CSCL 20/4

A review is presented of the first year of research performed in an investigation aimed at developing a calculation scheme for predicting general three-dimensional flows in curved passages of circular and square cross-section. The experimental component deals with the implementation and validation of a laser-Doppler velocimeter and associated instrumentation. The numerical component deals with the development of a technique for reducing numerical diffusion in the calculation scheme. An update is provided of the current status of the research. A tentative schedule of work for years two and three is also given. Author (GRA)

N81-23422# Naval Postgraduate School, Monterey, Calif.
INVESTIGATION OF HEAT TRANSFER IN STRAIGHT AND CURVED RECTANGULAR DUCTS M.S. Thesis
James Claude Ballard, III Sep. 1980 72 p refs
(AD-A097368) Avail: NTIS HC A04/MF A01 CSCL 20/13

Experimental investigations have been conducted to examine the general problem of convective heat transfer in a rectangular cross section channel with both straight and curved passages. The experimental configuration was modeled as infinite parallel plates with one wall at a constant heat flux and the opposite wall adiabatic. The air flow through the channel was heated through the Joulean heating of a wall composed of Temsheet. Liquid crystals applied to the surface of the Temsheet were used to confirm the presence of the Taylor-Gortler vortices. Average Nusselt number mesurements were used to investigate their effect on heat transfer from the curved test section. Experiments were conducted for steady state laminar flow that was hydrodynamically developed and thermally developing. It was confirmed that the Taylor-Gortler vortices enhanced the heat transfer process in the curved section. The experimental data was compared with several analytic studies with good results. Author (GRA)

N81-23423# Ballistic Research Labs., Aberdeen Proving Ground, Md. Ballistic Research Lab.
ANALYTIC MODEL AND NUMERICAL SIMULATION OF SHOCK WAVE PROPAGATION INTO A REENTRANT CORNER
J. A. Schmitt, R. E. Lottero, and H. J. Goodman Jan. 1981

114 p refs
(DA Proj. 1L1-61102-AH-43)
(AD-A097471; AD-E430582; ARBRL-TR-02286) Avail: NTIS HC A06/MF A01 CSCL 20/1

An analytical model is developed and numerical simulations are performed for shock wave propagation into a reentrant corner. The analytical and numerical results are compared with shock tube experiments performed in a 100 deg reentrant corner with a moderate strength (P sub 1/P sub 0 = 2.37, shock overpressure 137.9 kPa) incident shock and a weak (P sub 1/P sub 0 = 1.12, shock overpressure 12.41 kPa) incident shock. The analytical model provides an exact solution of the flow field if shock diffraction does not occur within the reentrant corner; it also provides an approximation to the peak vertex pressure which is comparable with experimental results if diffraction does occur. Both regular and Mach reflections are modeled. When the corner has finite length, an estimate of the duration of the peak vertex pressure is given. The numerical simulations are performed with the Eulerian hydrodynamic computer code DORF. In the DORF calculations, the reentrant corner is formed by a rigid smooth wall and a rigid stair-step wall. A detailed discussion of the stair-step construction and comparisons of the pressure distributions along these walls are included. Furthermore, the analytical and numerical pressure results for an infinitely long reentrant corner are compared. GRA

N81-23424# Tel-Aviv Univ. (Israel). Dept. of Applied Mathematics.
FINITE ELEMENTS FOR FLUID DYNAMICS Final Report, 1 Jul. 1979 - 30 Jun. 1980
Nima Geffen Aug. 1980 93 p refs
(Contract F49620-79-C-0203; AF Proj. 2307)
(AD-A097215; AFOSR-81-0288TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

The first two parts of this report wind up a few questions in the mathematical formulation of vector fields governed by conservation and rotationality laws, with explicit application to fluid dynamic fields, possibly with shock waves. The points treated have a strong bearing on computational schemes and the stability of numerical calculations and the results provide a priori information on the way to select the appropriate set of equations, the right functional, and the most promising approximation space for finite element discretizations. The last assertion is then tested for the tricomi equation in a nonuniformly elliptic domain. A mixed Tricomi problem is discretized by an alternative collocation scheme which proves to be acoustic and stable as demonstrated on a few test-cases. The collocation finite difference schemes have proven superior thus to the finite elements for this case. They are, however, more specialized and natural for linear problems and simple geometries. The variationally based finite elements, on the other hand, hold a better promise for complex geometries, and for an accurate treatment of shocks. Author (GRA)

N81-23425# Aeronautical Research Associates of Princeton, Inc., N. J.
FUNDAMENTAL RESEARCH IN TURBULENT MODELING. PART 1: THEORY. PART 2: EXPERIMENT Final Technical Report, 1 Jan. 1979 - 31 Dec. 1980
Guido Sandri and Carmen Cerasoli Feb. 1981 89 p refs
(Contract F44620-76-C-0048; AF Proj. 2307)
(AD-A097431; ARAP-438-Pt-1; ARAP-438-Pt-2; AFOSR-81-0332TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

We develop a model of turbulent flows deduced from simple assumptions on the two-point tensor Rij whose first approximation consists in coupled equations for the Reynolds and scale tensors. The model, when specialized to homogeneous turbulence, contains two adjustable parameters with which we match the main features of both grid and sheared turbulence. The calculated integral scales for sheared turbulence are strongly directional. Thus the model allows one to compute, for the first time, a first approximation to the eddy structure in a sheared turbulent flow. Author (GRA)

N81-23426# Naval Underwater Systems Center, New London, Conn. Surface Ship Sonar Dept.
A NUMERICAL TREATMENT OF THE DYNAMIC MOTION OF A ZERO BENDING RIGIDITY CYLINDER IN A VISCOUS STREAM
Ding Lee and Robert M. Kennedy 10 Feb. 1981 44 p refs
(AD-A097450; NUSC-TR-6343) Avail: NTIS HC A03/MF A01 CSCL 20/4

Previous attempts to derive the homogeneous closed form solution to the problem of the dynamic motion of a zero bending rigidity cylinder in a viscous stream have expressed the solution as an infinite series involving Bessel functions of complex argument and order, which are often impractical to evaluate because of their complexity. Moreover, when these solutions are extended to nonhomogeneous situations, a harmonic time dependence is assumed that requires 'forcing' the system by an arbitrary time function using multiple solutions combined in the Fourier sense. This paper presents a general purpose numerical treatment formulated to overcome these difficulties. The numerical approach is based on finite difference schemes applied in conjunction with powerful numerical ordinary differential equation methods. The theory is examined with respect to consistency, stability, and convergence of these numerical procedures. A numerical example is included to demonstrate the validity of the treatment. Although an explicit boundary condition is absent from this study, a derived boundary condition is demonstrated to be adequate. Author (GRA)

N81-23427# Envirodyne Ltd., Waterloo (Ontario).
INVESTIGATION OF NUMERICAL MODELING TECHNIQUES FOR RECIRCULATIONS FLOWS: PARTS 1 AND 2 Final Report
A. Chandoke, A. B. Strong, P. R. Slawson, Z. Mazhar, and G. D. Raitby Feb. 1981 241 p refs Sponsored by EPRI
(EPRI Proj. 901-1)
(EPRI-CS-1665-Pt-1; EPRI-CS-1665-Pt-2) Avail: NTIS HC A11/MF A01

The results of an effort to develop a three dimensional numerical model for recirculating flows for the purpose of predicting plume recirculation in mechanical draft cooling towers are presented. A literature review and prevailing views of turbulence modeling for various physical problems are given. A model is then presented which adapts the full Reynolds stress equations. The cost of the solution of a large set of equations that comprise the mathematical model is studied. Several promising cost-reducing methods are described. Doe

N81-23428# Battelle Pacific Northwest Labs., Richland, Wash.
RELATIONSHIPS OF DISPERSIVE MASS TRANSPORT AND STOCHASTIC CONVECTIVE FLOW THROUGH HYDROLOGIC SYSTEMS
C. S. Simmons Jan. 1981 149 p refs
(Contract DE-AC06-76RL-01830)
(PNL-3302) Avail: NTIS HC A07/MF A01

Uncertainty in water flow velocity appears to be major factor in determining the magnitude of contaminant dispersion expected in a ground water system. Some concepts and mathematical methods relating dispersive contaminant transport to stochastic aspects of ground water flow are discussed. The theory developed should not be construed as absolutely rigorous mathematics, but is presented with the intention of clarifying the physical concepts. DOE

N81-23429# Brown Univ., Providence, R. I. Div. of Engineering.
NEXT STEPS IN TWO-PHASE FLOW: EXECUTIVE SUMMARY
Ronald DiPippo Sep. 1980 59 p Presented at the Symp. on the Next Steps in Two-Phase Flow, Providence, 21 Jul. 1980
(Contract DE-AC02-79ET-27225)
(DOE/ET-27225/12; CONF-800786; GEOFLO/8) Avail: NTIS HC A04/MF A01

The following topics are discussed: the state of affairs; the fundamental governing equations; the one dimensional mixture model; the drift flux model; the Denver Research Institute two-phase geothermal flow program; two-phase flow pattern transition criteria; a two-fluid model under development; the mixture model as applied to geothermal well flow; DRI downwell instrumentation; and two-phase flow instrumentation. Information on the Sperry Research Corporation downhole pump and gravity-head heat exchanger systems and the Brown University two-phase flow experimental program are also presented. DOE

N81-23430# Texas A&M Univ., College Station. Ocean Engineering Program.

A NONLINEAR ANALYSIS OF LIQUID SLOSHING IN RIGID CONTAINERS Final Report

Y. K. Lou, T. C. Su, and John E. Flipse Aug. 1980 220 p refs

(Contract MA-79-SAC-B0018)

(PB81-135204; COE-241; TAMU-FE-4084; MA-RD-940-80092) Avail: NTIS HC A10/MF A01 CSCL 13J

Liquid sloshing in a tank is a nonlinear phenomenon. When the amplitude of tank oscillation is large, two types of nonlinearities are present. One occurs at the free surface due to large fluid motion. The other occurs at the fluid tank interface. Two nonlinear theories were developed in which the effects of large tank motions on liquid sloshing are properly accounted for. One theory is applicable for the near resonance oscillations while the other is valid when the tank is oscillating at a frequency away from resonance. GRA

N81-23431# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

TECHNICAL EVALUATION REPORT ON THE FLUID DYNAMIC PANEL SYMPOSIUM ON SUBSONIC/TRANSONIC CONFIGURATION/AERODYNAMICS

Horst Koerner Jan. 1981 19 p refs

(AGARD-AR-146; ISBN-92-835-1380-0) Avail: NTIS HC A02/MF A01

Papers presented at the various sessions are highlighted. Topics cover prediction methods, weapons carriage, configuration optimization, powered jet interaction, and multicomponent interference. Conclusions from the discussion are considered from the point of view of computational fluid dynamics, interference aspects, and optimization. Recommendations are offered. A.R.H.

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N81-23432*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

NASA METROLOGY AND CALIBRATION, 1980 Final Report

Washington NASA 10 Apr. 1981 153 p ref Proceedings of the 4th Ann. Workshop, Hampton, Va., 21-23 Oct. 1980

(NASA-CP-2174; L-14380) Avail: NTIS HC A08/MF A01 CSCL 13B

The proceedings of the fourth annual NASA Metrology and Calibration Workshop are presented. This workshop covered (1) review and assessment of NASA metrology and calibration activities by NASA Headquarters, (2) results of audits by the Office of Inspector General, (3) review of a proposed NASA Equipment Management System, (4) current and planned field center activities, (5) National Bureau of Standards (NBS) calibration services for NASA, (6) review of NBS's Precision Measurement and Test Equipment Project activities, (7) NASA instrument loan pool operations at two centers, (8) mobile cart calibration systems at two centers, (9) calibration intervals and decals, (10) NASA Calibration Capabilities Catalog, and (11) development of plans and objectives for FY 1981. Several papers in this proceedings are slide presentations only. Author

N81-23433*# Stanford Univ., Calif. Dept. of Aeronautics and Acoustics.

APPLICATION OF HOLOGRAPHY TO THE STUDY OF HELICOPTER ROTOR FLOW FIELDS Semiannual Progress Report, 1 Jul. - 31 Dec. 1980

Donald Baganoff 29 May 1981 37 p refs

(Grant NAG2-45)

(NASA-CR-164293) Avail: NTIS HC A03/MF A01 CSCL 20F

The feasibility of an experiment which is intended to measure the density field about a model helicopter rotor using holographic interferometry is considered. The numerical simulation used to study the experiment is described as well as the measurement technique itself. Data generated by the simulation are presented and prospects for both determining the density field from these data, and for actually obtaining such data in practice are assessed. A few significant problems which may be expected to arise are indicated and discussed. Author

N81-23434*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A SOLID-STATE DIGITAL TEMPERATURE RECORDER FOR SPACE USE

Richard M. Westbrook, Lawrence D. Bennett, Robert A. Steinhaver, and Gordon J. Deboo Apr. 1981 75 p

(NASA-TM-81267; A-8482) Avail: NTIS HC A04/MF A01 CSCL 14C

A solid-state, digital, temperature recorder has been developed for use in space experiments. The recorder is completely self-contained and includes a temperature sensor; all necessary electronics for signal conditioning, processing, storing, control and timing; and a battery power supply. No electrical interfacing with the particular spacecraft on which the unit is used is required. The recorder is small, light, and sturdy, and has no moving parts. It uses only biocompatible materials and has passed vibration and shock spaceflight qualification tests. The unit is capable of storing 2048, -10 to +45 C, 8-bit temperature measurements taken at intervals selectable by factors of 2 from 1.875 to 240 min; data can be retained for at least 6 months. The basic recorder can be simplified to accommodate a variety of applications by adding memory to allow more data to be recorded, by changing the front end to permit measurements other than temperature to be made, and by using different batteries to realize various operating periods. Stored flight data are read out from the recorder by means of a ground read-out unit. Author

N81-23435*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

AN INTEGRATED EXHAUST GAS ANALYSIS SYSTEM WITH SELF-CONTAINED DATA PROCESSING AND AUTOMATIC CALIBRATION

R. C. Anderson and R. L. Summers 1981 15 p refs Presented at the Aerospace/Test Meas. Symp., Indianapolis, 27-30 Apr. 1981; sponsored by Instrument Soc. of Am.

(NASA-TM-81592; E-786) Avail: NTIS HC A02/MF A01 CSCL 14B

An integrated gas analysis system designed to operate in automatic, semiautomatic, and manual modes from a remote control panel is described. The system measures the carbon monoxide, oxygen, water vapor, total hydrocarbons, carbon dioxide, and oxides of nitrogen. A pull through design provides increased reliability and eliminates the need for manual flow rate adjustment and pressure correction. The system contains two microprocessors to range the analyzers, calibrate the system, process the raw data to units of concentration, and provides information to the facility research computer and to the operator through terminal and the control panels. After initial setup, the system operates for several hours without significant operator attention. E.A.K.

N81-23436# Environmental Research Inst. of Michigan, Ann Arbor. Radar and Optics Div.

THICK PHASE HOLOGRAMS Final Scientific Report, 1 May 1978 - 30 Sep. 1980

K. A. Winick Jan. 1981 219 p refs

(Contract F49620-78-C-0061; AF Proj. 2305)

(AD-A097201; ERIM-134200-10-F; AFOSR-81-0196TR) Avail: NTIS HC A10/MF A01 CSCL 14/5

This report describes a two year research program to investigate thick phase holographic gratings. The first year effort primarily involved a study of hologram formation in dichromated gelatin. The results of that study can be found in the interim scientific report. The second year effort was a theoretical study of optical propagation through horizontally stratified, thick, phase

reflection gratings. In this report, a general theory is developed for determining the complex reflection and transmission coefficients of such gratings as a function of incident angle, wavelength and polarization. Theorems are stated and proved about polarization effects and about the relationship between the spectral and angular characteristics of such gratings. The inverse scattering problem is considered. Given the spectral and angular characteristics of a horizontally stratified, quasi-sinusoidal, phases grating, first and second order approximate techniques are developed for determining the corresponding refractive index profile. It is also shown that horizontally stratified phase gratings can be used as position-invariant, frequency domain filters in coherent optical systems. Their basic filtering properties are presented. Finally, an interferometric technique is developed for fabricating horizontally stratified, quasi-sinusoidal, phase gratings. GRA

N81-23437# Sandia Labs., Albuquerque, N. Mex.
PHOTOFERROELECTRIC IMAGE STORAGE IN PLZT CERAMICS Final Report, Feb. 1978 - Feb. 1981
Cecil E. Land and Paul S. Peercy Mar. 1981 56 p refs
(Contract AT(29-1)-789; DA Proj. 1L1-61102-BH-57)
(AD-A097448; ARO-15206.12-P) Avail: NTIS HC A04/MF A01 CSCL 14/5

The photosensitivity of lead lanthanum zirconate titanate (PLZT) ceramics is increased by as much as four orders of magnitude by implantation of inert gas ions in the image storage surface. The photoferroelectric image storage device can be used as a temporary image store, for contrast enhancement of the stored image, and for holographic storage. Author (GRA)

N81-23438# Technology, Inc., Dayton, Ohio.
STRUCTURAL INTEGRITY RECORDING SYSTEM (SIR) FOR U.S. ARMY AH-1G HELICOPTERS Final Report, Jul. 1975 - Nov. 1979
Thomas G. Farrell, Raymond B. Johnson, and Michael C. Tyler Mar. 1981 216 p refs
(Contract DAAJ02-75-C-0050; DA Proj. 1F2-62209-AH-76)
(AD-A097283; USAAVRADCOM-TR-80-D-15) Avail: NTIS HC A10/MF A01 CSCL 01/3

A Structural Integrity Recording System (SIRS) was designed and developed to track the fatigue damage accumulation on 10 critical helicopter components for the subsequent timely replacement of such components for safer and more economical helicopter operation. SIRS comprises three discrete but interrelated subsystems: an airborne microprocessor-based recorder, a portable flight-line data retrieval unit, and a software system. The validation of SIRS, initially configured for the AH-1G helicopter, consisted of two phases. Phase I (Development Test and Evaluation - DT E) covered the design, fabrication, laboratory qualification testing, reliability analysis, and flight-testing of the prototype SIRS recorder. Phase II (Initial Operational Test and Evaluation - IOT E) covered the evaluation of the entire system operation and the resultant data acquired during a 3-month recording period with five AH-1G's, each equipped with a SIRS recorder. As the documentation of both DT E and IOT E, this report describes the characteristics and functions of the entire system and details the successful performance of the SIRS recorder in the laboratory qualification testing and the flight environment. The SIRS recorder performed as designed, operated reliably, and yielded valid data. Author (GRA)

N81-23439# Army Missile Command, Redstone Arsenal, Ala. Ground Equipment and Missile Structure Directorate.
ACOUSTICAL HOLOGRAPHIC RECORDING WITH COHERENT OPTICAL READ-OUT AND IMAGE PROCESSING
Hua-Kuang Liu 3 Oct. 1980 33 p refs
(DA Proj. 1L1-62303-A-214)
(AD-A097299; AD-E950106; DRSMI/RL-81-2-TR) Avail: NTIS HC A03/MF A01 CSCL 14/5

New acoustic holographic wave memory devices have been designed for real-time in-situ recording applications. The basic operating principles of these devices and experimental results through the use of some of the prototypes of the devices are presented. Recording media used in the device include thermoplastic resin, Crisco vegetable oil, and Wilson corn oil. In addition, nonlinear coherent optical image processing techniques including equidensitometry, A-D conversion, and pseudo-color, all based on the new contact screen technique, are discussed with regard to the enhancement of the normally poor-resolved acoustical holographic images. Author (GRA)

N81-23440# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
EVALUATION OF A TETHERED KITE ANEMOMETER Final Report
Kenneth E. Kunkel Feb. 1981 31 p refs
(DA Proj. 1T1-61102-A-91A)
(AD-A097082; ERADCOM/ASL-TR-0076) Avail: NTIS HC A03/MF A01 CSCL 04/2

A kite anemometer which can obtain windspeed and wind direction in the range of 3 to 40 1/ms up to heights of 500 meters has been tested for potential Army applications. It has been found to be inexpensive, portable, easy to use, and able to operate under strong winds (up to 40 1/ms). Wind profiles using the kite anemometer were measured at a mountaintop location. These profiles demonstrate the ability of the kite to obtain windflow characteristics in rugged terrain. Possible Army applications of the anemometer include wind measurements to: (1) support electro-optical and high energy laser testing, (2) determine windflows in complex terrain, and (3) detect dangerous, low-level wind shears at military airports. GRA

N81-23441# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
DIGITAL HAND-HELD TEMPERATURE MONITOR
L. V. Allin and I. Ferrari Sep. 1980 18 p refs
(AD-A097130; DCIEM-80-R-45) Avail: NTIS HC A02/MF A01 CSCL 17/2

A hand-held non-invasive monitoring instrument has been designed, constructed and tested to allow core temperature measurements to be obtained from human subjects who have swallowed a temperature-sensing radio transmitter (radio pill). This instrument uses a simple AM radio for a receiver, digital circuitry to decode the received signal and a four-digit LED module to display the temperature. The unit, which is battery-powered, can be held in one hand while an antenna probe is swept over the abdomen of the subject until a continuously audible signal is generated by a piezoelectric sound source, indicating reception. The digital display then presents the body core temperature in tenths of a degree Celsius. Author (GRA)

N81-23442# Los Alamos Scientific Lab., N. Mex.
INSTRUMENT DEVELOPMENT FOR MATERIALS SCIENCE RESEARCH AT WNR
J. Eckert, R. N. Silver, A. Soper, P. J. Vergamini, I. Goldstone, A. Larson, P. A. Seeger, and J. Yarnell 1980 34 p Presented at the ICANS 4th Conf., Tsukuba, Japan, 20-24 Oct. 1980
(Contract W-7405-eng-36)
(LA-UR-80-2969; CONF-8010141-1) Avail: NTIS HC A03/MF A01

The goals of the program are: to gain experience with neutron instrumentation at spallation neutron sources; and to explore the scientific potential for condensed matter research at these sources. The proton storage ring funded for construction will provide improved intensity, time of flight resolution, and repetition rate. The initial emphasis, given limited manpower and resources, was placed on developing a set of prototype instruments which are relatively easy to implement. DOE

N81-23443# Oak Ridge National Lab., Tenn. Engineering Physics Div.
MONTE CARLO SIMULATION OF AN AC TUAL SEGMENTED CALORIMETER: A STUDY OF CALORIMETER PERFORMANCE AT HIGH ENERGIES
T. A. Gabriel, B. L. Bishop, M. S. Goodman (Harvard Univ.), A. L. Sessoms (Harvard Univ.), B. Eisenstein (Illinois Univ.), S. C. Wright (Chicago Univ.), and R. D. Kephart (Fermi National Accelerator Lab.) Jan. 1981 25 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7123) Avail: NTIS HC A02/MF A01

The calculated responses including energy resolution, angular resolution, and spatial energy deposition of a segmented iron and liquid-argon calorimeter to incident pions in the energy range of 10- to 250-GeV are presented. Experimental data for this calorimeter were obtained in the 10- to 40-GeV energy range

and these results compare favorably with the calculated data.
DOE

N81-23444# California Univ., Livermore. Lawrence Livermore Lab.
SURVEY OF HYDROGEN MONITORING DEVICES
W. Lai Jan. 1981 19 p refs Presented at the Workshop on the Impact of Hydrogen on Water Reactor Safety, Albuquerque, N.M., 26-28 Jan. 1981
(Contract W-7405-eng-48)
(UCRL-84164; CONF-810120-1) Avail: NTIS HC A02/MF A01

Presented are results of a survey of commercially available monitoring devices suitable for hydrogen detection in the secondary containment vessel of a nuclear power plant during the post postulated accident period. Available detectors were grouped into the following five classes: combustion; solid state; electrochemical; thermal conductivity; and absorption. The performance of most available sensors is likely to deteriorate when exposed to the postulated conditions which include moisture, which could be at high temperature, and radioactive noncondensibles. Of the commercial devices, those using metallic filament thermal conductivity detectors seem least susceptible to performance change. Absorption detectors are best suited for this monitoring task but the only available device is designed for pipeline corrosion assessment. Initiation of experimental study to assess apparent deficiencies of commercial detectors is recommended.
DOE

N81-23445# National Bureau of Standards, Washington, D.C. National Measurements Lab.
EXAMINATION OF DISTANCE MEASURING DEVICES Final Report
Stephen Hasko Dec. 1980 66 p refs
(PB81-147332; NBS-HB-137; LC-80-600182) Avail: NTIS HC A04/MF A01 CSCL 13F

This is a manual for State and local weights and measures officials, describing distance measuring devices such as odometers and taximeters to be tested, testing equipment and its calibration, inspection and testing procedures, and a reporting system. Provision is made for accommodating a changeover to metric units of device examination in the definitions, tables, procedures, and in reporting a test.
GRA

N81-23446# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
SPACE SYSTEMS: AN AURORAL IMAGING SPECTROPHOTOMETER (VACUUM ULTRAVIOLET AND VISIBLE)
F. W. Schenkel Aug. 1980 77 p refs
(PB81-133621; JHU/APL-CP-079) Avail: NTIS HC A05/MF A01 CSCL 14B

An imaging system is described that will provide spectrophotometric data of the Earth's aurora from a satellite-based platform. The instrument has two camera heads, one operating in the vacuum ultraviolet (12.0 to 200.0 nm) spectrum, the other operating in the visible/near ultraviolet (300.0 to 750.0 nm) spectrum. The camera heads are equipped with a variety of spectral bandfilters that are selectable from a filter wheel to define the auroral spectral band of interest. Each camera has a collapsible sunshade that is deployed after spacecraft launch. An illumination sensor is included to provide solar damage protection. Separate processing electronics exist for each camera head, but they are switchable between heads to provide selective redundancy. Each camera head uses the most recent developments in microchannel plate image intensifiers in conjunction with solid-state two-dimensional matrix sensors.
GRA

N81-24000*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Microwave Observational System Sect.
ORION: MICROWAVE WATER VAPOR RADIOMETER SUBSYSTEM DESIGN
R. P. McKinney and N. I. Yamane *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 10-14 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N81-23447# General Motors Research Labs., Warren, Mich. Physics Dept.
INFRARED HOLE - BURNING SPECTROSCOPY OF MATRIX ISOLATED ReO4(-) MOLECULES
A. R. Chraplyvy, W. E. Moerner (Cornell Univ., Ithaca, N.Y.), and A. J. Sievers (Cornell Univ., Ithaca N.Y.) [1981] 10 p refs Sponsored by General Motors Research Laboratories
Avail: NTIS HC A02/MF A01

Carbon dioxide laser/diode laser hole burning spectroscopy was used to measure the temperature dependent homogeneous linewidth of the ReO4(-) infrared active internal vibrational mode in alkali halide lattices. Hole widths as small as 20 MHz (FWHM) were observed in an inhomogeneously broadened line of width as 1 cm. Measurement of the homogeneous linewidth over 4 orders of magnitude indicates that elastic acoustic phonon scattering is the dominant T(2) relaxation process from 10 K to 600 K.
Author

N81-23448*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DISCOVERY OF NATURAL GAIN AMPLIFICATION IN THE 10 MUON M CO2 LASER BANDS ON MARS: THE FIRST DEFINITE NATURAL LASER
M. Mumma, David Buhl, Gordon Chin, Drake Deming, Fred Espenak, Theodor Kostiuk, and David Zipoy (Maryland Univ.) Nov. 1980 20 p refs Submitted for publication
(NASA-TM-82048) Avail: NTIS HC A02/MF A01 CSCL 20E

Fully resolved intensity profiles of various lines in the CO2 bands at 9.4 micrometers and 10.4 micrometers were measured on Mars using an infrared heterodyne spectrometer. Analysis of the line shapes shows that the Mars atmosphere exhibits positive gain on these lines, providing the first definite detection of natural optical gain amplification and enabling identification of these lines as the first definite natural laser ever discovered.
Author

N81-23449# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
RESEARCH IN LASER PROCESSES Final Report, 1 Jul. 1975 - 15 May 1980
A. V. Phelps and A. C. Gallagher 15 Jan. 1981 177 p refs (Contract N00014-76-C-0123; ARPA Order 2683; NR Proj. 393-506)
(AD-A097563) Avail: NTIS HC A09/MF A01 CSCL 20/5

Measurements at very high rare gas densities have yielded the contribution of trimer molecules, e.g., NaXe2, to the absorption and stimulated emission continuum of metal vapor-rare gas excimers. Attempts to obtain a sufficiently high electron and excited state temperature in a pulsed discharge in high pressure metal vapor-rare gas mixtures were unsuccessful because of the approach of the system to local thermodynamic equilibrium and the limited peak electrical energy available. A model was developed to describe the temporal growth of the cathode fall in an electron-beam initiated electric discharge. The electron drift tube technique for the measurement of electron excitation coefficients was applied to the A3 sigma and b1 sigma metastable states of N2 and O2, respectively, and was extended to make possible laser absorption measurements of excitation coefficients for the 3P2 metastable and 3P1 resonance states of Ne. Experimental measurements of fluorescent intensities from the resonance state of Na with white light and laser excitation, show agreement with theory when the theory is modified to include hyperfine structure and the non-radiative transport of resonance excitation.
Author (GRA)

N81-23450# California Inst. of Tech., Pasadena. Electrical Engineering and Applied Physics Dept.
THIN FILM OPTICAL DEVICES AND QUANTUM ELECTRONICS Final Report, 1 Jul. 1978 - 30 Sep. 80
Amnon Yariv 30 Sep. 1980 5 p refs
(Grant AF-AFOSR-3685-78)
(AD-A097246; AFOSR-81-0241TR) Avail: NTIS HC A02/MF A01 CSCL 20/5

An exact treatment of the space charge effect in the single-electron analysis of a free electron laser is presented to calculate its small signal gain. With the support of the contract with AFOSR, we have undertaken the task of developing a theoretical model for predicting the electrooptic (EO) coefficient of crystals. A new project is now underway to grow, epitaxially, low threshold, CW, semiconductor GaAs/GaAlAs laser with output of apertures which more nearly approximate the dimensions of optical fibers. Author (GRA)

N81-23451# Philips Labs., Briarcliff Manor, New York. Exploratory Research Group.
DEVELOPMENT OF A NOVEL LASER MATERIAL FOR MINIATURIZED LASER SYSTEMS Quarterly Technical Report, 8 Nov. - 31 Dec. 1980
Walter Zwicker, Sel Colak, and Jacob Khurgin Mar. 1981 37 p
(Contract MDA903-81-C-0034; DARPA Order 4040)
(AD-A097477) Avail: NTIS HC A03/MF A01 CSCL 20/5

The purpose of this research is to determine which of the various stoichiometric neodymium materials is best suited for the construction of a miniature 1.06 micrometer laser. To optimize such a laser, miniature laser rods will be fabricated from single crystals of the most promising materials and evaluated with suitable test circuitry/cavities. For synthesis and crystal growth of the various stoichiometric neodymium compounds, several flux growth furnaces were constructed and two pulling systems permitting 'top seeded' crystal growth were installed. Preliminary growth experiments on crystals of NdP5O14 and Nd(x)Y(1-x)A13 (BO3)4 were performed, and some of the resulting crystals were evaluated. Equipment was set up for measuring fluorescence lifetimes and emission and absorption spectra and cross-sections. Based on preliminary computer calculations for optimization of the miniature laser cavity, an elliptical cavity and a dual-elliptical cavity were fabricated. Author (GRA)

N81-23452# TRW Defense and Space Systems Group, Redondo Beach, Calif.
LASER ASSISTED SEMICONDUCTOR DEVICE PROCESSING Final Technical Report, 1 Jun. 1978 - 30 Nov. 1980
30 Nov. 1980 127 p refs
(Contract MDA903-78-C-0284; ARPA Order 3578)
(AD-A097427) Avail: NTIS HC A07/MF A01 CSCL 20/12

This report is divided into two separate sections, Part 1 and Part 2. Part 1 covers the work on 'Laser Induced Surface Processing'. The objective of Part 1 was to evaluate and characterize laser-induced processing of semiconductor materials and devices. The objective of Part 2 was to evaluate the laser blow-off ion implantation source. This new method involves a source of implant ions produced by laser 'blow-off' from a piece of dopant material. Energy from a short-pulse laser is focused onto the surface of the dopant material, forming a small bubble of dopant plasma which 'blows-off'. This plasma bubble is allowed to expand into vacuum until its density and area become suitable for electrostatic acceleration to the necessary ion implant energy. GRA

N81-23453# Mississippi State Univ., Mississippi State. Dept. of Electrical Engineering.
A TIME DOMAIN SIMULATION OF A BEAM CONTROL SYSTEM Final Report, 1 Jan. - 31 Dec. 1980
Jerrel R. Mitchell 28 Feb. 1981 56 p refs
(Grant AF-AFOSR-0108-80; AF Proj. 2305)
(AD-A097423; MSSU-EIRS-EE-81-3; AFOSR-81-0323TR)
Avail: NTIS HC A04/MF A01 CSCL 20/5

The Airborne Laser Laboratory (ALL) is being developed by the Air Force to investigate the integration and operation of high energy laser components in a dynamic airborne environment and to study the propagation of laser light from an airborne vehicle to an airborne target. The ALL is composed of several systems; among these are the Airborne Pointing and Tracking System (APT) and the Automatic Alignment System (AAS). This report presents the results of performing a time domain dynamic simulation for an integrated beam control system composed of the APT and AAS. The simulation is performed on a digital computer using the MIMIC language. It includes models of the dynamics of the system and of disturbances. Also presented in the report are the rationales and developments of these models. The data from the simulation code is summarized by several plots. In addition results from massaging the data with waveform analysis packages are presented. The results are discussed and conclusions are drawn. Author (GRA)

N81-23454# TRW Defense and Space Systems Group, Redondo Beach, Calif.
KrF LASER FUSION: PERFORM OPTICAL SYSTEMS STUDY OF DIRECT SHORT PULSE EXTRACTION Final Technical Report, 26 Jun. 1978 - 14 Mar. 1981
R. S. Bradford, Jr., J. A. Betts, R. Aprahamian, and P. M. Livingston Mar. 1981 116 p refs
(Contract DE-AC08-78DP-40069)
(DOE/DP-40069/3) Avail: NTIS HC A06/MF A01

The performance of KrF in a regime of inertial confinement fusion was determined both experimentally and analytically. Using a master oscillator power amplifier configuration, 100J was obtained from a 5 optical volume KrF amplifier pumped at 300 KW/cu cm peak at the end of a 500 nsec pulse. A normalized input flux of 0.4 was required to reduce amplified spontaneous emission to one half of the free running value. A peak extraction efficiency of 0.46 was obtained under these conditions at 1 atm total pressure. The kinetics model was refined in agreement with high and low pump regimes and an integrated kinetics and pulse propagation code was developed. DOE

N81-23455# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
COMPETING REACTION CHANNELS IN IR-LASER-INDUCED UNIMOLECULAR REACTIONS Ph.D. Thesis
Michael Robert Berman Jan. 1981 248 p refs
(Contract W-7405-eng-48)
(LBL-12213) Avail: NTIS HC A11/MF A01

The competing reaction channels in the unimolecular decomposition of two molecules, formaldehyde and tetralin, were studied. A TEA CO2 laser was used as the excitation source in all experiments. The dissociation of D2CO was studied by infrared multiphoton dissociation (MPD) and the small molecule nature of formaldehyde with regard to MPD was explored. The effect of collisions in MPD were probed by the pressure dependence of the MPD yield and IR fluorescence from multiphoton excited D2CO. MPD yield shows a near cubic dependence in pure D2CO which is reduced to a 1.7 power dependence when 15 torr of NO is added. The peak amplitude of 5 (SIGMA) m IR fluorescence from D2CO is proportional to the square of the D2CO pressure in pure D2CO or in the presence of 50 torr of Ar. Results are explained in terms of bottlenecks to excitation at the v = 1 level which are overcome by a combination of vibrational energy transfer and rotational relaxation. DOE

N81-23456# California Univ., Livermore.
TWO-WAVELENGTH HeNe LASER INTERFEROMETER
E. H. A. Granneman (FOM Inst. for Atomic and Molecular Physics, Amsterdam) 24 Mar. 1981 13 p refs
(Contract W-7405-eng-48)
(UCID-18988) Avail: NTIS HC A02/MF A01

An interferometer set up in which two wavelengths are used simultaneously is presented. Separate determination of the phase shifts caused by changes in plasma density and by mechanical vibration of the interferometer structure is described. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N81-23457 Pennsylvania State Univ., University Park.
MACHINING WITH A ROUND-NOSED FORM TOOL Ph.D. Thesis
Carl Ralph Beiswenger 1980 251 p
Avail: Univ. Microfilms Order No. 8107538

Black steel pipe (ASTM A-120) was turned with a straight-edged orthogonal form tool (M2 high speed steel). Experimental results were used to predict the cutting forces that occur when the tool shape is changed from a straight edge to a circular edge. Cutting tests were run on a heavy duty lathe with a

water-based coolant. Measured values included tangential and radial cutting forces, and chip thickness. A built-up edge occurred for almost every set of cutting conditions. Some pipe samples were sectioned and traced with a specially constructed trace device. The analog surface profile was digitized and analyzed by a microcomputer to determine the effect of the built-up edge upon the surface roughness of the machined part. A statistical analysis of cutting forces and chip thickness encountered when cutting with a straight edge orthogonal form tool allowed formulation of experimental equations for shear stress, shear angle, and friction angle. Dissert. Abstr.

N81-23458 Wisconsin Univ. - Madison.
DISTRIBUTED COMPUTING FOR ADVANCED LEVELS OF MACHINERY CONTROL Ph.D. Thesis
Neil Arthur Duffie 1980 282 p
Avail: Univ. Microfilms Order No. 8105269

The essential characteristics of distributed processing systems are described and the attributes of these systems are related to the requirements of machinery control. Alternative network architectures are reviewed as are methods for synchronizing events in remote processors and maintaining a global time frame. A procedure is developed for the design of distributed machinery control systems. Hardware and software are described for a network interface used to support an irregular network of general purpose to support multiple processes. Constructions are defined for machine language and the high level language PASCAL to allow user processes to communicate via the network and to access other system functions. An application example of a distributed control system is discussed. The system features advanced motion generation and control concepts and configurable master/slave relationships between a variable number of drives. A two processor network is used as a demonstration to control two drives. Dissert. Abstr.

N81-23459 Wisconsin Univ. - Madison.
COMPENSATORY CONTROL OF FORM ERROR IN MACHINING Ph.D. Thesis
Surendra Balakrishna Rao 1980 128 p
Avail: Univ. Microfilms Order No. 8102219

In order to dissolve the existing tie-up between high precision and high costs in machining, an approach for controlling form errors is proposed. The approach, called 'Compensatory Control,' is based on mathematical modeling of the variable or variables contributing to the form error, using the Dynamic Data Systems methdology and then forecasting the future value of this variable by virtue of the developed model. Compensatory action can then be taken to offset the effect of the forecast value of the variable. In order to demonstrate the feasibility of this approach, a compensatory control system is developed to improve the roundness error of a component ground in a cylindrical chuck grinding operation. Before this can be attempted, a study is made to determine the major cause of roundness error in that particular operation. Analysis established the error motion of the work spindle as a major contributor to the form error of roundness in that particular operation. Based on this concept, a microcomputer-based compensatory control system was developed using a spindle error sensing system and an electrohydraulic drive system to generate the compensation. Dissert. Abstr.

N81-23460# Energy and Minerals Research Co., Exton, Pa.
EFFICIENT ULTRASONIC GRINDING: A NEW TECHNOLOGY FOR MICRON-SIZED COAL Quarterly Technical Progress Report, 16 Mar. - 15 Jun. 1980
W. B. Tarpley, Jr., P. L. Howard, and G. R. Moulder 1 Jul. 1980 18 p
(Contract DE-AC02-79ER-10466)
(DOE/ER-10466/T2; QTPR-3) Avail: NTIS HC A02/MF A01

Design and development of the dual roller comminution apparatus based on operation and evaluation of the cylinder segment test apparatus was explored. Determinations of the degree of preferential liberation of pyrite and ash inclusions were conducted and the ultrasonic effect was demonstrated. In preliminary tests, 67% of the pyrite and at least 21% of the ash inclusions were liberated and were amenable to settling collection in the -10 micron size range. Larger scale testing is conducted to expand the data base and better quantify the degree of preferential liberation. DOE

N81-23461*# Michigan Univ., Ann Arbor. Dept. of Mechanical Engineering and Applied Mechanics.
HEAT GENERATION IN AIRCRAFT TIRES UNDER FREE ROLLING CONDITIONS
Samuel K. Clark and Richard N. Dodge Dec. 1980 90 p Sponsored by NASA
(NASA-CR-164273) Avail: NTIS HC A05/MF A01 CSCL 01C

Effort is directed toward construction of a rational method for evaluating internal temperatures of aircraft tires. Enhanced predictability of tire temperature buildup is a design tool in both the tire and airframe industries. S.F.

N81-23462*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA FIVE-BALL FATIGUE TESTER: OVER 20 YEARS OF RESEARCH
Erwin V. Zaretsky, Richard J. Parker, and William J. Anderson 1981 57 p refs Presented at the Intern. Symp. on Contact Rolling Fatigue Testing of Bearing Steel, Phoenix, Ariz., 12-14 May 1981; sponsored by the Am. Soc. for Testing and Mater.
(NASA-TM-82589; E-720) Avail: NTIS HC A04/MF A01 CSCL 14B

Studies were conducted to determine the effect on rolling-element fatigue life of contact angle, material hardness, chemistry, heat treatment and processing, lubricant type and chemistry, elastohydrodynamic film thickness, deformation and wear, vacuum, and temperature as well as Hertzian and residual stresses. Correlation was established between the results obtained using the five-ball tester and those obtained with full scale rolling-element bearings. E.D.K.

N81-23463# Princeton Univ., N. J. Dept. of Civil and Geological Engineering.
IMPACT AND PENETRATION PROBLEMS Final Report, Jun. 1976 - Jan. 1981
A. C. Eringen and N. Ari 16 Mar. 1981 26 p refs
(Contract DAAG29-76-G-0254)
(AD-A097413; ARO-13534.8-E; Rept-81-SM-5) Avail: NTIS HC A03/MF A01 CSCL 11/6

Impact and penetration phenomena are investigated by recently established nonlocal continuum theories. Constitutive equations are developed for nonlocal elastic and plastic materials. The problems of nonlocal line crack, half space under punch, plug formation and perforation of visco-plastic plates are solved. The absence of singularities made it possible to introduce several fracture and penetration initiation criteria based on maximum stress hypotheses. Author (GRA)

N81-23464# Shaker Research Corp., Ballston Lake, N. Y.
LABORATORY INVESTIGATION OF WATER-LUBRICATED ELASTOMERIC BEARINGS
R. L. Smith, A. I. Krauter, and C. H. T. Pan Jan. 1981 40 p refs
(Contract N00014-74-C-0278)
(AD-A097109; SRC-80-TR-64) Avail: NTIS HC A03/MF A01 CSCL 13/9

This report concerns an experimental laboratory study of the sliding friction behavior of water-lubricated rubber stave bearings. Speed dependent friction characteristics were measured because they are associated with the phenomenon of audible self-excited vibrations. As part of an effort to establish guidance for the design of noise-free stern tube bearings, the friction-speed curves for five modified designs were obtained and were compared with those for a conventional design. Author (GRA)

N81-23465# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Vehicle Equipment Div.
STATIC AND DYNAMIC EVALUATION OF A-37 CAST AND CAST CARCASS/INTEGRAL TREAD TIRES Final Report, Sep. 1977 - Sep. 1979
Paul C. Ulrich Nov. 1980 325 p refs
(Contract F33615-76-C-3062; AF Proj. 2402)
(AD-A097684; AFWAL-TR-80-3055) Avail: NTIS HC A14/MF A01 CSCL 01/3

This report describes work undertaken during Phases 2 and 3 of a three phase program initiated with Zedron Inc., to establish

the potential of cast tires for application to Air Force aircraft. Phases 2 and 3 involved static, quasi-static, and dynamic laboratory test and evaluation of 30 cast 7.00-8 Type III aircraft tire designs. These designs included tire carcasses which were rotationally cast/molded from thermoplastic polyester elastomer materials (Hytrels) of various hardness with and without reinforcements. Three basic cast tire designs were developed and evaluated during Phase 2 efforts; the one-piece cast tire, the cast carcass/replaceable tread tire, and the cast carcass/integral tread tire. The development of the one-piece cast tire was terminated after three design iterations (15 tires) were evaluated due to its shortened dynamic life caused by tread groove failures (areas of high stress concentration). The development of the two-pieces cast carcass/replaceable tread tire was terminated after two design iterations (10 tires) were evaluated primarily due to tread derailment problems. These designs, however, represented a considerable improvement over the one-piece cast tire designs as the tread groove failures (areas of high stress concentration) were eliminated by replacing the thermoplastic material with conventional tire materials in the tire tread. Twenty-five integral tire design iterations (105 tires), some of which included glass reinforcement, were tested and evaluated to the A-37 aircraft main gear tire specifications. GRA

N81-23466# Naval Research Lab., Washington, D. C. Materials Modification and Analysis Branch.

APPLICATION OF ION IMPLANTATION FOR THE IMPROVEMENT OF LOCALIZED CORROSION RESISTANCE OF M50 STEEL BEARINGS Interim Report

G. K. Hubler, J. K. Hirvonen, I. Singer, C. R. Gossett, C. R. Clayton, Y. F. Wang, H. E. Munson, and G. Kuhlman 30 Mar. 1981 48 p refs

(RR0220844; WF4140100)

(AD-A097230; NRL-MR-4481) Avail: NTIS HC A03/MF A01 CSCL 11/6

A program is currently underway to use ion implantation to improve the tribiological and corrosion characteristics of load bearing surfaces in both rolling element bearings and gears used in aircraft propulsion systems. This report describes that aspect of the program concerned with the use of ion implantation for surface alloying of bearing components in order to alleviate the problem of corrosion in M50 steel mainshaft aircraft engine bearings. Author (GRA)

N81-23467# Naval Civil Engineering Lab., Port Hueneme, Calif. Naval Construction Battalion Center.

HOLDING CAPACITY OF PLATE ANCHORS Final Report, Jul. 1974 - Sep. 1979

R. M. Beard Oct. 1980 83 p refs Sponsored by Naval Facilities Engineering Command

(YF59556091)

(AD-A097116; CEL-TR-882) Avail: NTIS HC A05/MF A01 CSCL 13/2

This handbook-style report has been prepared to assist the engineer with limited geotechnical experience, in determining the holding capacity of a plate anchor for all loading conditions: short-term static holding capacity, long-term static holding capacity, impulse loading holding capacity, cyclic loading holding capacity, cyclic creep holding capacity, and the effects of earthquake loading. A flow diagram leads the user to appropriate sections of the report in the process of analyzing the various types of anchor holding capacity. The user begins with site survey, soil property requirements, and assesses whether unusual or hazardous soil conditions exist. The short-term static holding capacity is then determined. From this base the user proceeds to the other holding capacity topics as required by the expected loading conditions. Author (GRA)

N81-23468# Energy and Minerals Research Co., Exton, Pa.

EFFICIENT ULTRASONIC GRINDING: A NEW TECHNOLOGY FOR MICRON-SIZED COAL Quarterly Technical Progress Report, 16 Dec. 1979 - 15 Mar. 1980

W. B. Tarpley, Jr., P. L. Howard, and G. R. Moulder 3 Apr. 1980 22 p

(Contract DE-AC02-79ER-10466)

(DOE/ER-10466/T3; QTPR-2) Avail: NTIS HC A02/MF A01

Varying the mechanical gain of the ultrasonic comminution apparatus increased the strain amplitude of the system and enhanced fines production. These features used with an ultrasonic cylinder segment apparatus resulted in 276% increase in the production of -10 micron fines over that generated by passing coal through a non-activated control. The Phase I apparatus offers the flexibility of operating with either traveling or standing ultrasonic waves. Varying the physical configuration (dual-roller or roller plate) and the mode of ultrasonic activation (traveling or standing wave) allows for cost effective testing of four different techniques. Additionally, operating frequency was reduced to 15 kHz to permit use of off-the-shelf hardware in apparatus assembly and thus expedite testing. Selection of four representative, well-characterized coals was completed. DOE

N81-23469# Battelle Columbus Labs., Ohio.

STRAP: STEAM TURBINE ROTOR ANALYSIS PROGRAM. PART 1: GENERAL INFORMATION MANUAL

H. G. Pennick, comp. Jan. 1981 49 p refs Prepared in cooperation with Southwest Research Inst., San Antonio Sponsored by Electric Power Research Inst.

(EPRI-NP-1687-Pt-1) Avail: NTIS HC A03/MF A01

The automated Steam Turbine Rotor Analysis Programs (STRAP) were developed to facilitate the prediction of rotor lifetime. The STRAP programs consist in part of a preprocessor which generates the boundary conditions and finite element mesh for transient and steady state temperature and stress analysis. The generated input is utilized by ANSYS, a general purpose, finite element structural analysis program. A post-processor within the STRAP system contains fracture toughness, stress rupture, yield strength, and fatigue crack growth rate data for air melted CrMoV forgings, on which ANSYS-calculated stress and temperature values are screened to determine critical crack size, initial crack size that could grow to critical within a specified number of hours or cycles, and minimum area fraction of defects which could link to results in a signification crack. A boresonic data reduction program allows rapid scanning of indicated flaw sizes and locations to find the regions of greatest defect density. DOE

N81-23470# General Electric Co., Schenectady, N. Y. Gas Turbine Div.

HIGH-TEMPERATURE COMBUSTION GAS TURBINE PROGRAM

R. S. Rose Sep. 1980 96 p refs

(Contract DE-AC01-76ET-10340)

(NYSERDA-80-12) Avail: NTIS HC A05/MF A01

Specific objectives are to: investigate heat transfer; erosion; corrosion; and deposition characteristics of selected bucket internal cooling channel configurations; perform design analysis and fabricate part scale turbine buckets having design features similar to those applicable to a full scale heavy duty gas turbine; and perform design analysis and investigations related to the application of the above elements of work to a part scale turbine development rig test and to a full scale utility gas turbine test vehicle. DOE

N81-23471# General Electric Co., Schenectady, N. Y. Gas Turbine Div.

HIGH-RELIABILITY GAS TURBINE COMBINED-CYCLE DEVELOPMENT PROGRAM. PHASE 1: SUMMARY

R. G. Kunkel Jan. 1981 70 p 2 Vol.

(EPRI Proj. 1187-3)

(EPRI-AP-1681-SU) Avail: NTIS HC A04/MF A01

Tradeoff studies of reliability versus cost, performance, firing temperature and other parameters formed the basis for all major design approaches and decisions in the conceptual design of a gas turbine combined-cycle plant. The inherent reliability, as defined by field data, was used as a basis from which to predict the expected reliability and power cost of a variety of near term conceptual gas turbine hardware and cycle configurations. Results indicate that the highest reliability, the lowest power cost, and greatest fuels flexibility may not be found within one configuration. The gas turbine was conceptually developed around a 19850 F (10850 C) firing temperature cycle. The total plant was developed using maintainability, serviceability and the potential need for conversion to coal-derived fuels and other duty cycles. The controls and accessories were found to provide cost effective changes and modifications. DOE

N81-23472# General Electric Co., Schenectady, N. Y. Gas Turbine Div.

HIGH-RELIABILITY GAS TURBINE COMBINED-CYCLE DEVELOPMENT PROGRAM, PHASE 1, VOLUME 2 Final Report

R. G. Kunkel Jan. 1981 350 p refs 2 Vol.
(EPRI Proj. 1187-3)
(EPRI-AP-1681-Vol-2) Avail: NTIS HC A15/MF A01

The availability goals can be met at all levels of equipment from the combustion-turbine unit to the total plant, but mean-time-between-failures (MTBF) goals can only partially be met. The combustion-turbine unit alone could approximately meet the MTBF goal (9000 hours), while the combustion-turbine system could only reach an MTBF of about 1000 hours. When the steam cycle and its electric generator, associated equipment, and balance-of-plant items were added, the total plant MTBF was predicted to be no greater than roughly 500 hours. The field-data analyses indicated that the number of forced outages in the combustion-turbine system were caused mainly by the ancillary equipment, while the major contributor to the number of forced outage hours was the combustion turbine. Although a definitive list of reliability-improving changes was not feasible, it was feasible to determine some beneficial design parameters and to arrive at a design with a significant improvement in reliability. These modifications include the application of redundancy, improvement in accessories controls and instrumentation, and the addition of diagnostic capabilities. DOE

N81-23473# General Electric Co., Schenectady, N. Y. Gas Turbine Div.

HIGH-TEMPERATURE TURBINE TECHNOLOGY PROGRAM TURBINE SIMULATOR TESTS WITH COAL-DERIVED LOW-Btu GAS FUEL

M. W. Horner Nov. 1980 155 p refs
(Contract DE-AC01-76ET-10340)
(FE-1806-92) Avail: NTIS HC A08/MF A01

The component design and technology testing of a large water cooled composite turbine nozzle and a low-Btu gas fuel combustor for an integrated gasification combined cycle power plant are discussed. DOE

N81-23474# Automotive Environmental Systems, Inc., Westminster, Calif.

TESTING OF NEW TECHNOLOGY: THREE-WAY CATALYST EQUIPPED VEHICLES IN LOS ANGELES Final Report

Alan D. Jones Aug. 1980 164 p
(Contract EPA-68-03-2881)
(PB81-138075; EPA-460/3-80-027) Avail: NTIS HC A08/MF A01 CSCL 13F

Exhaust emissions test data and other related information obtained in the testing and inspection of 116 in-use passenger cars is summarized. The test fleet consisted of 1979-1980 automobiles equipped with three-way catalyst emission control systems. The test vehicles were obtained randomly from private owners in the Los Angeles and Orange County areas. The test sequence consisted of the 1975 Federal Test Procedure, a Highway Fuel Economy test, a Bagged Idle test, a 50 mph Cruise test, a Four-Speed Idle test and a Loaded Two Mode test. GRA

N81-23475# Bureau of Mines, Albany, Oreg. Albany Research Center.

SHAPE-CASTING TITANIUM IN OLIVINE, GARNET, CHROMITE, AND ZIRCON RAMMED AND SHELL MOLDS Report of Investigations, 1980

R. K. Köch and J. M. Burrus 1980 40 p refs
(PB81-147274; BM-RI-8443) Avail: NTIS HC A03/MF A01 CSCL 13H

Substitutes for the critical metals chromium, cobalt, and nickel were sought and techniques to shape casting titanium in rammed sand molds were investigated. Castings were made in olivine, garnet, chromite, and, for comparison, zircon. It was found that commercial grade castings up to 31 lb could be made in zircon or olivine molds if a zirconia mold wash was used. Castings up to 4 lb were made in chromite molds, but heavier castings suffered from some mold-metal reaction. Garnet molds were unsatisfactory for castings of all sizes because of gasblows and rough surfaces. Shell castings produced in water molds were unsatisfactory because rough casting surfaces were caused by mold-metal reaction. Unlike the commercial processes, neither the rammed sand nor the shell molding processes generate noxious fumes at any step. GRA

N81-23476# Bureau of Mines, Albany, Oreg. Albany Research Center.

CLADDING OF METALS TO IRON BY VACUUM ROLLING

R. Blickensderfer 1980 32 p refs
(PB81-150096; BM-RI-8481) Avail: NTIS HC A03/MF A01 CSCL 13H

To investigate cladding, a vacuum-rolling mill capable of rolling bimetal specimens at temperatures to 1,300 C in a residual gas pressure of 2 x 0.00002 torr was established. Metals successfully bonded to iron included stainless steels, chromium, nickel, nickel alloys, copper, and several refractory metals including molybdenum and titanium. The effects of the rolling temperature, reduction in thickness, rolling speed, and residual air pressure on bonding strength and bend ductibility of the bimetals were determined. Optimum rolling conditions produced bimetals with bond shear strength essentially equal to that of the iron base metal. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N81-23477*# Battelle Columbus Labs., Ohio.

COMPARATIVE ANALYSIS OF TECHNIQUES FOR EVALUATING THE EFFECTIVENESS OF AIRCRAFT COMPUTING SYSTEMS

Ellis F. Hitt, Michael S. Bridgman, and Alfred C. Robinson Apr. 1981 156 p refs
(Contract NAS1-15760)
(NASA-CR-159358) Avail: NTIS HC A08/MF A01 CSCL 14D

Performability analysis is a technique developed for evaluating the effectiveness of fault-tolerant computing systems in multiphase missions. Performability was evaluated for its accuracy, practical usefulness, and relative cost. The evaluation was performed by applying performability and the fault tree method to a set of sample problems ranging from simple to moderately complex. The problems involved as many as five outcomes, two to five mission phases, permanent faults, and some functional dependencies. Transient faults and software errors were not considered. A different analyst was responsible for each technique. Significantly more time and effort were required to learn performability analysis than the fault tree method. Performability is inherently as accurate as fault tree analysis. For the sample problems, fault trees were more practical and less time consuming to apply, while performability required less ingenuity and was more checkable. Performability offers some advantages for evaluating very complex problems. S.F.

N81-23478# National Bureau of Standards, Washington, D.C. National Engineering Lab.

A BASIS FOR TRACEABLE NDE MEASUREMENTS

D. G. Eitzen, H. Berger, and G. Birnbaum Dec. 1980 18 p refs
(PB81-145757; NBSIR-80-2109) Avail: NTIS HC A02/MF A01 CSCL 14B

The National Bureau of Standards is beginning to provide a mechanism for traceability for a number of NDE measurement procedures, an activity that is expected to have a significant, positive impact on the reproducibility and accuracy of NDE measurements. Much of the NDE standards activity has been in ultrasonics and acoustic emission, these efforts leading to calibration services for ultrasonic reference blocks and ultrasonic and acoustic emission transducers. Additional NDE standards are also available or are being developed in radiography, eddy currents, magnetic particles, liquid penetrants and visual testing. GRA

N81-24011*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
THE RELIABILITY OF MULTISTATE, MULTIOUTPUT SYSTEMS
E. J. Subelman *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 96-104 ref (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 14D

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N81-23479 Pennsylvania State Univ., University Park.
MICROSTRUCTURAL EFFECTS ON THE MECHANICAL PROPERTIES AND THERMAL SHOCK RESISTANCE OF A HIGH ALUMINA REFRACTORY CONCRETE Ph.D. Thesis
Joseph Homeny 1980 328 p
Avail: Univ. Microfilms Order No. 8107580

The mechanical properties and thermal shock damage resistance of seven specially designed calcium aluminate bonded alumina aggregate refractory concretes were investigated. The cement and aggregate constituents were systematically varied in accordance with particle packing theory in order to examine their effects on the fracture behavior. The properties examined included: (1) the bulk density; (2) the elastic moduli; (3) the fracture stress; (4) the fracture toughness; (5) the notched beam and work of fracture surface energies; (6) the critical strain energy release rate and the critical value of the J-Integral; and (7) the slow crack growth parameter, the N value. Thermal shock damage resistance was evaluated by quenching techniques for each different concrete system. Theoretical thermal shock damage resistance parameters, derived from the mechanical properties, were correlated with the experimentally observed trends in the thermal shock behavior. Dissert. Abstr.

N81-23480 Johns Hopkins Univ., Baltimore, Md.
X-RAY DIFFRACTION MEASUREMENT OF RESIDUAL STRESS (STRAIN): ENERGY DISPERSIVE X-RAY RESIDUAL STRESS MEASUREMENT Ph.D. Thesis
Ronald George Rosemeier 1981 262 p
Avail: Univ. Microfilms Order No. 8106647

As a result of forming, joining, machining, grinding, shot peening, carburizing, nitriding, and heat treating processes, a solid material is often found to be in a state of internal stress (strain) even though all externally applied stresses have been removed. Since these residual stresses (strains) can markedly affect the performance of a material, it is important to be able to measure them. X-ray diffraction techniques, the oldest of the nondestructive methods for measurement of residual stress, are investigated. Section 1 considers sources of error, precision of various experimental geometries, choice of radiation, sample preparation, grain size, X-ray penetration depth, Lorentz-polarization, absorption factors, and X-ray elastic constant determination. In Section 2, the energy dispersive X-ray residual stress analysis technique is compared on a one-to-one basis with conventionally established X-ray angular dispersive and strain gauge measurement techniques. Dissert. Abstr.

N81-23481 Cincinnati Univ., Ohio.
INVESTIGATION OF SOME MULTIPLE INPUT/OUTPUT FREQUENCY RESPONSE FUNCTION EXPERIMENTAL MODAL ANALYSIS TECHNIQUES Ph.D. Thesis
Randall J. Allemang 1980 359 p
Avail: Univ. Microfilms Order No. 8107478

Methods which reduce the variance of the estimates of the modal parameters determined by the frequency response function experimental modal analysis method are studied. The redundant information contained in the frequency response function matrix is used in order to formulate the best least squares estimate of the modal parameter. The concept of enhanced frequency response function is developed to use a row or column of the frequency response function matrix in order to improve frequency and damping estimates. The concepts of modal scale factor and modal assurance criterion are developed to evaluate and utilize redundant modal vector estimates in order to improve the modal vector estimates. Finally, in order to obtain multiple columns of the frequency response function matrix simultaneously, the multiple input frequency response function method is investigated. The concepts and techniques were demonstrated experimentally on several test objects, including a T-plate test structure, a Schweitzer sailplane, and an automotive frame. Dissert. Abstr.

N81-23482 Akron Univ., Ohio.
LARGE AND SMALL DEFORMATION FINITE ELEMENT ANALYSIS OF ROLLING CONTACT Ph.D. Thesis
Ibrahim Fathy Zeid 1981 555 p
Avail: Univ. Microfilms Order No. 8107427

The global structural response resulting from moving surface mechanical fields generated in contact interface zones of rolling structures is obtained. The finite element approach is employed to determine this response. As an outgrowth of this approach, a new rolling contact isoparametric element is developed with the capacity to handle small as well as large deformation problems. Due to the form of the element, this solution is possible without recourse to direct numerical integration. The generality of the approach allows the solutions to a full range of rectilinear rotary kinetics and kinematics problems. Phenomena such as resonances and standing as well as traveling subsonic and supersonic waves are studied. Also, the full compliment of inertial fields as well as viscoelastic material behavior are analyzed. Finally, the rolling contact profiles and energy calculations are determined over a wide range of rolling speeds. Dissert. Abstr.

N81-23483# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 13, NO. 4
Apr. 1981 79 p refs
(AD-A097950) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375; $15.00/set CSCL 20K

Various methods used in analyzing the free vibration of ring structures and open-curved beams are reviewed. The Fokker-Planck-Kolmogorov equation is applied to the problem of predicting the response of nonlinear mechanical and structural systems to random excitation. For individual titles, see N81-23484 through N81-23485.

N81-23484# Slovak Academy of Sciences, Bratislava (Czechoslovakia). Inst. of Materials and Machine Mechanics.
VIBRATION OF CURVED BEAMS
S. Markus and T. Nanasi *In* The Shock and Vibration Inform. Center (Defense) The Shock and Vibration Dig., Vol. 13, No. 4 Apr. 1981 p 3-14 refs (For primary document see N81-23483 14-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375; $15.00/set CSCL 20K

Because they are important in many practical applications, free vibrations of curved beams in their own plane or out-of-plane are the subject of numerous investigations. Various methods for analyzing the effects of curvature in connection with other complicating phenomena are reviewed. These phenomena include rotary inertia, shear deformation, extension of the central line, dislocations of the central and neutral axes, distribution of the stress along the cross section, damping and boundary conditions. The influence of these phenomena on the mechanics of vibration of curved beams is also considered. A.R.H.

N81-23485# Sussex Univ., Brighton (England). School of Engineering and Applied Sciences.
RESPONSE OF NONLINEAR MECHANICAL SYSTEMS TO RANDOM EXCITATION. PART 1: MARKOV METHODS
J. B. Roberts *In* The Shock and Vibration Inform. Center (Defense) The Shock and Vibration Dig., Vol. 13, No. 4 Apr. 1981 p 17-28 refs (For primary document see N81-23483 14-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 23075; $15.00/set CSCL 20K

Recent progress in applying the theory of Markov processes, in particular the Fokker-Planck-Kolmogorov equation, to the problem of predicting the response of nonlinear systems to

random excitation is reviewed. A variety of approximate methods of solution are discussed; emphasis is on applications. A.R.H.

N81-23486*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MEGA16 - COMPUTER PROGRAM FOR ANALYSIS AND EXTRAPOLATION OF STRESS-RUPTURE DATA
C. Robert Ensign May 1981 46 p refs
(NASA-TP-1809; E-495) Avail: NTIS HC A03/MF A01 CSCL 20K

The computerized form of the minimum commitment method of interpolating and extrapolating stress versus time to failure data, MEGA16, is described. Examples are given of its many plots and tabular outputs for a typical set of data. The program assumes a specific model equation and then provides a family of predicted isothermals for any set of data with at least 12 stress-rupture results from three different temperatures spread over reasonable stress and time ranges. It is written in FORTRAN 4 using IBM plotting subroutines and its runs on an IBM 370 time sharing system. M.G.

N81-23487*# Kaman Aerospace Corp., Bloomfield, Conn.
ANALYTICAL TESTING Final Report, 27 Jun. 1978 - 15 Sep. 1980
W. G. Flannelly, J. A. Fabunmi, and E. J. Nagy Washington NASA May 1981 154 p refs
(Contract NAS1-15414)
(NASA-CR-3429; R-1614) Avail: NTIS HC A08/MF A01 CSCL 20K

Analytical methods for combining flight acceleration and strain data with shake test mobility data to predict the effects of structural changes on flight vibrations and strains are presented. This integration of structural dynamic analysis with flight performance is referred to as analytical testing. The objective of this methodology is to analytically estimate the results of flight testing contemplated structural changes with minimum flying and change trials. The category of changes to the aircraft includes mass, stiffness, absorbers, isolators, and active suppressors. Examples of applying the analytical testing methodology using flight test and shake test data measured on an AH-1G helicopter are included. The techniques and procedures for vibration testing and modal analysis are also described. Author

N81-23488*# Stanford Univ., Calif.
ON CERTAIN INTEGRALS WHICH PERTAIN TO THE FORCED VIBRATION OF PLATES Interim Report
Harold Levine Oct. 1979 24 p refs
(Grant NsG-2215)
(NASA-CR-166175; SU-JIAA-TR-28) Avail: NTIS HC A02/MF A01 CSCL 20L

The various plate integrals previously considered by Crighton (1972) are directly recast in a manner that permits their systematic development near the source point; and thus to dispense with manipulation of the velocity transform. The advantage is the ease with which distributed forces over the plate are incorporated into the analysis. After the procedure is introduced in connection with a line source problem and followed by consideration of a point source, the analogous problems relative to uniformly distributed forces over strips or circular areas of the plate receive attention. S.F.

N81-23489*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
A FUNDAMENTAL APPROACH TO ADHESION: SYNTHESIS, SURFACE ANALYSIS, THERMODYNAMICS AND MECHANICS Final Technical Report
Betty Beck, Ranjani Siriwardane, and James P. Wightman Apr. 1981 113 p refs
(Grant NsG-1124)
(NASA-CR-164229) Avail: NTIS HC A06/MF A01 CSCL 20K

Pretreated and primed Ti 6-4 surfaces were characterized by scanning electron microscopy/energy dispersive analysis of X-rays (SEM/EDAX) and electron spectroscopy for chemical analysis (ESCA). Fractured lap shear bonded Ti 6-4 specimens were also characterized by SEM/EDAX and ESCA. A number of surface techniques were used to characterize TiO_2 powders. E.D.K.

N81-23490*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LUBRICATION FUNDAMENTALS
Bernard J. Hamrock Apr. 1981 8 p refs
(NASA-TM-81762; E-825) Avail: NTIS HC A02/MF A01 CSCL 11H

A lubricant is any substance that is used to reduce friction and wear and to provide smooth running and a satisfactory life for machine components. Lubrication fundamentals are discussed and the various lubrication mechanisms are defined. These include: hydrodynamic, elastohydrodynamic, mixed, boundary, and extreme pressure. Before the various lubrication mechanisms are presented, it is desirable to define conformal and nonconformal surfaces. J.M.S.

N81-23491*# Case Western Reserve Univ., Cleveland, Ohio.
A SINGLE-EXPRESSION FORMULA FOR INVERTING STRAIN-LIFE AND STRESS-STRAIN RELATIONSHIPS
S. S. Manson and U. Muralidharan May 1981 31 p refs
(Contract NAG3-46)
(NASA-CR-165347) Avail: NTIS HC A03/MF A01 CSCL 20K

Starting with the basic fatigue lift formula, an inversion formula is derived. The inversion formula is valid over the entire life range of engineering interest for all materials examined. Conformity between the two equations is extremely close, suitable for all engineering problems. The approach used to invert the life relation is also suitable for the inversion of other formulas involving the sum of two power-law terms. E.D.K.

N81-23492*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
EXTENSION OF OBLIQUE INCIDENCE METHOD TO PHOTO-ORTHOTROPIC-ELASTICITY
R. Prabhakaran 1981 22 p refs
(Contract NCC1-26; Grant NSF CME-80-12956)
(NASA-CR-164334) Avail: NTIS HC A02/MF A01 CSCL 20K

With the interpretation of isochromatic and isoclinic fringes in transparent, birefringent, orthotropic composites established, efforts were in progress to determine the individual values of the principal stresses or strains. Several methods utilize the photoelastic results only partially and rely on numerical procedures. Others attempt to obtain the required information based entirely on experimental data. The classical oblique incidence technique as applied to transversely isotropic birefringent composites, is presented. The proposed extension is verified by applying it to the problem of an orthotropic half-plane subjected to an edge-load. E.D.K.

N81-23493# Aeronautical Research Labs., Melbourne (Australia).
ANALYSIS OF RESULTS FROM AN INTERNATIONAL FATIGUE TEST PROGRAMME
J. M. Finney May 1980 47 p refs
(AD-A097200; ARL/STRUC-383) Avail: NTIS HC A03/MF A01 CSCL 11/6

Under the auspices of the Commonwealth Advisory Aeronautical Research Council fatigue tests were made on identical 2L.65 aluminium alloy specimens in the UK, Canada and Australia; this report statistically examines the results to determine whether the same answer may come from nominally the same fatigue experiment. Viewing the complete set of data any differences between the results of the various countries were not significant. Viewing limited portions of the data some differences were significant. Variance differences were significant only at the lower stress levels used and involved predominantly UK (first set) and Canadian results. Differences between means were significant only at the upper stress levels used and involved predominantly Australian and UK (second set) results. Author (GRA)

N81-23494# Office of Naval Research, London (England).
INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS: 3RD SYMPOSIUM ON CREEP IN STRUCTURES
Terry R. McNelley (Royal Military Coll. of Science) 15 Dec. 1980 11 p Symp. held at Leicester, Engl., 8-12 Sep. 1980
(AD-A097420; ONRL-C-7-80) Avail: NTIS HC A02/MF A01

CSCL 20/11

The Symposia in this series occur once every ten years with the aim to review developments in the area of creep and creep mechanics. As such, this Symposium, with a total attendance of about 70, attracted many prominent workers in this field. Over the years, emphasis in this field has shifted from analysis of creep mechanics toward the problems of cavitation, void formation, creep cracking and rupture. This change is in part a result of metallurgical developments leading to stronger, more creep resistant materials but also less ductile materials. This was reflected in this Symposium as half the papers dealt with the various problems in the areas of cavitation, creep crack propagation and rupture. Furthermore, there was a significant input from Metallurgy and Materials' Science and the promotion of interaction between the Mechanics and Materials' Science and approaches to the subject of creep was an important secondary aim of this Symposium. GRA

N81-23495# Washington Univ., Seattle. Dept. of of Mechanical Engineering.

IMPACTED NOTCH BEND SPECIMEN

A. S. Kobayashi, M. Ramulu, and S. Mall (Maine Univ. at Orono) Mar. 1981 26 p refs

(Contract N00014-76-C-0060; NR Proj. 064-478)

(AD-A097131; TR-40) Avail: NTIS HC A03/MF A01 CSCL 11/6

The proposed method for testing and evaluating data generated by instrumented impact testings of notch bend specimens is evaluated by the experimental and numerical dynamic fracture results obtained in the past. As expected, brittle fracture of the photoelastic, steel and aluminum impacted notch specimens considered in this paper cannot be predicted by the static stress intensity factors at the instant of crack propagation. The fracture energy was only a fraction of the total absorbed energy and was equally unsuitable for dynamic fracture characterization of these specimens. This critical evaluation of the proposed method suggests that despite the enormous correlation studies which justify the use of static analysis, neither the proposed method nor the resultant static stress intensity factor should be used to evaluate the fracture data of impacted notch bend specimens of slightly different configurations. Author (GRA)

N81-23496# State Univ. of New York at Buffalo. Dept. of Engineering Science and Nuclear Engineering.

FREE TORSIONAL VIBRATIONS OF A HOLLOW CYLINDER WITH LAMINATED PERIODIC STRUCTURE Summary Report

R. K. Kaul and C. S. Lee Feb. 1981 46 p refs

(Contract N00014-75-C-0302)

(AD-A097163; Rept-122) Avail: NTIS HC A03/MF A01 CSCL 20/11

The theory of torsional vibrations of a circular, hollow cylinder with a piecewise constant periodic variation of rigidity modulus and mass density is developed in terms of Floquet waves. The dispersion spectrum is shown to have band structure, and the arrangement of characteristics sequence at the end-points of the Brillouin zone is studied. The problem of co-existence of periodic solution is examined in detail and the regions of stability and lability are charted. Author (GRA)

N81-23497# State Univ. of New York at Buffalo. Dept. of Engineering Science.

STRAIN-DEPENDENT CREEP DAMAGE IN RANDOM INHOMOGENEOUS MATERIALS Summary Report

C. Lee and F. A. Cozzarelli Nov. 1980 62 p refs

(Contract N00014-75-C-0302)

(AD-A097164; Rept-121) Avail: NTIS HC A04/MF A01 CSCL 20/11

Employing a recent homogeneous strain-dependent creep damage theory, the propagation of a failure front in a beam under pure bending is studied. A local inhomogeneous strain-dependent creep damage theory is then postulated, based on creep damage data obtained at J.R.C. Ispra for specimens of various lengths. Using this inhomogeneous theory, solutions for various loading conditions are obtained, and are shown to be in better agreement with observation than previous theories. Finally, the effect of random material parameters on the rupture time is considered for the constant tensile stress test and for the beam under pure bending. Author (GRA)

N81-23498# Aeronautical Research Labs., Melbourne (Australia).

COARSELY RANDOM CRACKING IN ONE-CRACK FATIGUE MODELS

D. G. Ford Mar. 1980 21 p refs

(AD-A097194; ARL/STRUC-382) Avail: NTIS HC A02/MF A01 CSCL 20/11

The continuity equation has been applied to fatigue crack models in which all cracks begin together to form a family of smooth trajectories proceeding at different rates. When the rates at a particular crack length are log-Normally distributed, it is possible to estimate the effect of the mean and variance of crack life in a reliability situation. For a logarithmic variance 0.1 of crack rates, the standard deviation of life is reduced by 14% approximately. This crack model has been applied to a previous one-crack analysis to allow randomness in both initiation and cracking. Author (GRA)

N81-23499# Lehigh Univ., Bethlehem, Pa. Center for the Application of Mathematics.

SOME THOUGHTS ON MATERIAL STABILITY

Ronald S. Rivlin Feb. 1981 38 p refs

(Contract N00014-76-C-0235)

(AD-A097350; CAM-100-36) Avail: NTIS HC A03/MF A01 CSCL 20/11

The paper is concerned with some underlying physical considerations which bear on the development of restrictions on the strain-energy function for an elastic material which may undergo finite deformations. Some comments are also made on the possible use of the strain-energy function at deformations for which a necessary condition for material stability is violated. Author (GRA)

N81-23500# Lehigh Univ., Bethlehem, Pa. Center for the Application of Mathematics.

SOME STABILITY CONDITIONS FOR A COMPRESSIBLE ELASTIC MATERIAL

Kenneth N. Sawyers and Ronald S. Rivlin Feb. 1981 25 p refs

(Contract N00014-76-C-0235)

(AD-A097351; CAM-100-35) Avail: NTIS HC A02/MF A01 CSCL 20/11

Two sets of restrictions on the strain-energy function for a compressible isotropic elastic material are obtained which are necessary conditions for stability of the material. These arise from the following considerations. (1) A rectangular block is subjected to a finite pure homogeneous deformation and an infinitesimal pure homogeneous deformation with arbitrary principal directions is superposed. The dimensions in two of these principal directions are held constant. Then the incremental modulus associated with the third principal direction must be positive for stability to obtain. (2) In the initial pure homogeneous deformation one pair of faces of the block is force-free. The superposed infinitesimal pure homogeneous deformation has one of its principal directions normal to these faces, which remain force-free, and the principal extension ratio corresponding to another is unity. The incremental modulus corresponding to the third principal direction must be positive for stability to obtain. GRA

N81-23501# Midwest Research Inst., Golden, Colo. Components Development Group.

ASSESSMENT OF EXISTING STUDIES OF WIND LOADING ON SOLAR COLLECTORS

L. M. Murphy Feb. 1981 35 p refs

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(SERI/TR-632-812) Avail: NTIS HC A03/MF A01

Current design and testing procedures for wind loading are discussed. The test results corresponding to numerous wind tests on heliostats, parabolic troughs, parabolic dishes, and field-mounted photovoltaic arrays are discussed and the applicability of the findings across the various technologies is assessed. One of the most significant consistencies in the data from all the technologies is the apparent benefit provided by fences and field shielding. These data show that load reductions of three or possibly more seem feasible, though a more thorough understanding of

the phenomena involved must be attained before this benefit can be realized. DOE

N81-23502# Midwest Research Inst., Golden, Colo.
WIND LOADING ON TRACKING AND FIELD-MOUNTED SOLAR COLLECTORS
L. M. Murphy Dec. 1980 10 p refs
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(SERI/TP-632-958) Avail: NTIS HC A02/MF A01

Current design and testing procedures for wind loading are discussed. The test results corresponding to numerous wind tests on heliostats, parabolic troughs, parabolic dishes, and field-mounted photovoltaic arrays are discussed and the applicability of the findings across the various technologies is assessed. One of the most significant consistencies in the data from all of the technologies is the apparent benefit provided by fences and field shielding. These data show that load reductions of three, or possibly more, seem feasible, though a more thorough understanding of the phenomena involved must be attained before this benefit can be realized. DOE

N81-23503# Battelle Pacific Northwest Labs., Richland, Wash. Advanced Nuclear Systems and Projects Div.
THE STRONTIUM HEAT SOURCE DEVELOPMENT PROGRAM Quarterly Report, Jun. - Sep. 1980
H. T. Fullam Feb. 1981 22 p refs
(Contract DE-AC06-76RL-01830)
(PNL-1845-48) Avail: NTIS HC A02/MF A01

Hastelloy S and Hastelloy C-4 subsize Charpy V-Notch (CVN) specimens that had been heated in air or vacuum at 600, 700, or 800 C for up to 10,000 h were impact-tested at room temperature. No significant differences in Charpy impact energy were observed between the CVN specimens heated in air and the control specimens heated in vacuum. The CVN specimens aged at 600 C showed the greatest reduction in Charpy impact energy, while the specimens aged at 800 C showed the least change. Qualification testing of the as-fabricated prototype outer capsules was completed. The capsules subjected to the impact (drop) test showed some distortion at the weld area but passed the helium leak test. DOE

N81-23504# California Univ., Davis. Dept. of Mechanical Engineering.
X-RAY DIFFRACTION STUDY OF RESIDUAL STRESS IN MODEL WELDMENTS Final Report
Roderick D. Stroud and James F. Shackelford Nov. 1980 16 p refs
(Contract W-7405-eng-48)
(UCRL-15332) Avail: NTIS HC A02/MF A01

Residual stress in a model weldment in nickel plate using X-ray diffraction techniques is described. The stress is mapped in 2 mm divisions up to the boundary of the weld pool. Results are in agreement with the stress levels previously predicted for this system by finite element studies. Recommendations are made permitting 1 mm (2) spatial resolution maps of residual stress in stainless steel weldments. DOE

N81-23505# European Space Agency, Paris (France).
LINEAR-ELASTIC AND ELASTIC PLASTIC FRACTURE MECHANICS OF STRUCTURAL MATERIALS Ph.D. Thesis
Dietrich Munz Dec. 1980 242 p refs Transl. into ENGLISH of 'Linear-elastische u. elastische-plastische Bruchmech. von Konstruktionswerkstoffen", DFVLR, Cologne Report DFVLR-FB-79-31, Jul. 1979 Original report in GERMAN previously announced as X81-72067
(ESA-TT-649; DFVLR-FB-79-31) Avail: NTIS HC A11/MF A01

The methods of linear-elastic and elastic-plastic fracture mechanics are reviewed. The basic principles and the problems of fracture mechanics are shown. Based on results on aluminum and titanium alloys and on steel, problems of the evaluation, assessment and application of the different characteristic values are discussed. Linear-elastic fracture mechanics is shown to be applicable to smaller specimens and components than is usually assumed. The J integral method is at present most promising and is emphasized. Methods for determining the J integral are presented, and applications to some load displacement curves are shown. Determination of J sub o at the onset of stable crack extension is discussed. Author (ESA)

42 GEOSCIENCES (GENERAL)

N81-23506*# General Technical Services, Inc., Upper Darby, Pa.
CONTRIBUTIONS TO A THERMODYNAMIC MODEL OF EARTH SYSTEMS ON RIVERS Final Report
A. S. Iberall Feb. 1981 16 p refs
(Contract NASw-3378)
(NASA-CR-164272) Avail: NTIS HC A02/MF A01 CSCL 08F

A model for the chemical (ground water) erosion and physical (bed load, including sedimentation) erosion of the land was developed. The rudiments of the relation between a regulated sea level (for the past 2500 million years) and the episodic rise and erosion of continents was examined to obtain some notion of the process scalings. Major process scales of about 200 years, 100,000 years, 3 My, 40 My, 300 My were estimated. It was suggested that a program targeted at ecological management would have to become familiar with processes at the first four scales (i.e., from glaciation to the horizontal movement of continents). The study returns to the initial premise. In order to understand and manage Earth biology (life, and modern man), it is necessary minimally to pursue systems' biogeology at a considerable number of process space and time scales via their irreversible thermodynamic couplings. A.R.H.

N81-23507# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE PHYSICAL BASIC OF THE IONOSPHERE IN THE SOLAR-TERRESTRIAL SYSTEM
Feb. 1981 384 p refs Presented at the 27th Meeting of the Electromagnetic Wave Propagation Panel, Pozzuoli, Italy, 28-31 Oct. 1980
(AGARD-CP-295; ISBN-92-835-0284-1) Avail: NTIS HC A17/MF A01

The processes that produce and control the distribution of ionization in the ionosphere as a component of the solar terrestrial system are considered. Several examples of modeling and prediction techniques are given that can be applied by the terrestrial users of the electromagnetic spectrum. For individual titles, see N81-23508 through N81-23541.

N81-23508*# Air Force Geophysics Lab., Hanscom AFB, Mass.
THE SOLAR ULTRAVIOLET SOURCE FOR THE IONOSPHERE AND ITS VARIATION c46
Hans E. Hinteregger *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
(NASA Order S-50030-AG)
Avail: NTIS HC A17/MF A01 CSCL 04A

Ion production in the ionospheric E and F regions is primarily due to solar EUV fluxes at wavelengths below 102.7 nm, where the flux ratios of maximum/minium for the present solar cycle were found to range from values around 3 for the dominant chromospheric emissions to much higher values for coronal emissions, resulting in a factor of about 4 in the integrated flux of the range 14-102.7 nm. The vertical distribution of ion production depends not only on the incident solar EUV fluxes but also on the structure of the absorbing neutral atmosphere (thermosphere). As the latter is strongly affected by solar EUV fluxes above 130 nm (production of atomic oxygen and heating), the observed increase, with ratios ranging from about 1.2 around 175-185 nm to about 2.3 around 140 nm, is at least indirectly important in the solar cycle variation of the ionosphere. The EUV variability models of the ionosphere using non EUV indices such as F sub 10.7, R sub Z or Ca2 plage indices are valuable as a crude guide only, but not for quantitative representations. Author

N81-23509# Fraunhofer Inst., Freiburg (West Germany).
SOLAR RADIATIONS AND THEIR INTERACTIONS WITH

THE TERRESTRIAL ENVIRONMENT **c47**
G. Schmidtke *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

The measurement of solar wind parameters as well as solar electromagnetic radiation in different spectral ranges are considered. The variability of the radiations and some aspects of these competing energy sources for the terrestrial atmosphere are discussed. R.C.T.

N81-23510# Imperial Coll. of Science and Technology, London (England). Blackett Lab.
MAGNETOSPHERIC AND IONOSPHERIC FLOW AND THE INTERPLANETARY MAGNETIC FIELD **c46**
S. W. H. Cowley *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 14 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

The flux tube and plasma flow within the Earth's magnetosphere and the resulting flow in the ionosphere are discussed, with particular reference to effects associated with the interplanetary magnetic field (IMF). Whem IMF B sub z less than or is at least not strongly positive, two cell convection occurs at high latitudes with antisunwar flow over the polar cap. The size of the cells depends on IMF, as expected from the Dungey open magnetosphere model, but part of the convection appears to be driven by viscous magnetopause boundary layers. Asymmetries occur in the two cell flow about noon midnight meridian in response to IMF B sub y which form a consistent set with a ready qualitative interpretation in terms of the open model. Sunward tailward shifts in the cells also occur in response to IMF B sub x which may be similarly interpreted. When IMF B sub z is strongly positive a qualitatively different ionospheric flow pattern occurs at high latitudes with sunward flow in at least part of the polar cap. Observations pertaining to this condition are reviewed, together with theoretical interpretations. R.C.T.

N81-23511# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
MAGNETOSPHERIC INFLUENCES ON THE IONOSPHERE **c46**
H. Kohl *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

Particle penetration, electric fields and plasma waves originating in the magnetosphere and propagating downward were investigated with respect to their effect on the ionosphere. A number of problems like the polar cap ionozation, the formation of the trough, the energy from Joule heat, and others are discussed. R.C.T.

N81-23512# Technische Hochschule, Darmstadt (West Germany).
IONOSPHERIC DISTURBANCES OF MAGNETOSPHERIC ORIGIN **c46**
H. Poeverlein and E. Neske (Fraunhofer-Inst. fuer Physikalische Messtechnik, Freiburg) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

Various types of coupling between magnetosphere and ionosphere are distinguished. Various phenomena occurring in connection with geomagnetic disturbances are discussed which give a clear evidence of magnetosphere ionosphere coupling. The displacement of the midlatitude trough of the ionosphere to lower L values (lower latitudes) with increased geomagnetic activity, corresponds to a similar displacement of the plasmapause. The large scale magnetospheric convection is demonstrated by theoretically derived pictures of streamlines. An expression for the location of the plasmapause in dependence on K sup p is obtained from some crude approximative relationships. R.C.T.

N81-23513*# Lockheed Missiles and Space Co., Palo Alto, Calif.
MAGNETOSPHERE-IONOSPHERE COUPLING THROUGH THE AURORAL ACCELERATION REGION **c46**
R. D. Sharp and E. G. Shelley *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 13 p refs (For primary document see N81-23507 14-42)
(Contracts NAS5-25773; NAS2-3395; Grant NSF ATM-79-11174)
Avail: NTIS HC A17/MF A01 CSCL 04A

An important form of coupling between the magnetosphere and the ionosphere occurs through acceleration mechanisms operative in the high altitude ionosphere on magnetic field lines connecting to the auroral zone. Energetic ion mass spectrometer data from within these auroral acceleration regions are presented to illustrate the characteristics of the mechanisms. Observations of ionospheric plasmas in the ring current, the distant plasma sheet, and the magnetotail lobes are shown illustrating the extent of their circulation and the importance of their contribution to the plasma in each regime. Finally the precipitating plasmas in the auroral region and the extent and peculiar effects of the O(+) component of that precipitation on the ionosphere are illustrated. R.C.T.

N81-23514*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
MODELLING THE HIGH-LATITUDE IONOSPHERE **c46**
W. J. Raitt, R. W. Schunk, and J. J. Sojka *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 14 p refs (For primary document see N81-23507 14-42)
(Contracts NAG2-77; F19628-79-C-0025; Grant NSF ATM-78-10501)
Avail: NTIS HC A17/MF A01 CSCL 04A

Results of an ionospheric model program are presented which demonstrate the extreme variability of the steady state, daytime, ionospheric F region electron density and ion composition due to both neutral atmospheric changes with solar cycle, season and magnetic activity, and to the effects of ionospheric drifts caused by perpendicular electric fields. Consideration is given to the time history of the ionospheric plasma as it undergoes convective motion due to the combined effects of corotation forces and electromagnetic forces which results from the mapping of the magnetospheric cross tail electric field to the rotating ionosphere. A simple model of the convection pattern is described. The model calculates the net effect of the tendency for the plasma to corotate about the geographic pole and the E sub Bar times B sub Bar velocity induced by a perpendicular electric field mapped to a circle centered about a point 5 deg antisunward of the geomagnetic pole and oriented such that the equipotentials are parallel to the noon midnight meridian. This convection pattern shows the generally accepted features of high latitude convection, but because of the offset between the geographic and geomagnetic poles a marked universal time dependence in these features is predicted. R.C.T.

N81-23515# Norwegian Defence Research Establishment, Kjeller.
THE PHYSICS OF RADIO WAVE ABSORPTION **c32**
E. V. Thrane *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 15 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

Various aspects of the physical causes of radio wave absorption in the ionosphere are reviewed. The theory for propagation of radio waves through a partially ionized atmosphere is developed. Physical models of the D region and lower E layer that may explain the observed variation of absorption are discussed. R.C.T.

N81-23516# Bonn Univ. (West Germany). Radioastronomical Inst.
ELECTRODYNAMICS OF THE LOWER IONOSPHERE **c46**
Hans Volland *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 13 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

The electrical conductivities of the ionospheric E and lower F layers (dynamo region) were investigated with respect to their potential to carry electric current systems. The state of the knowledge about electric current systems flowing within the ionospheric dynamo region as well as their generator mechanisms were reviewed. R.C.T.

N81-23517# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
THE EFFECTS OF AURORAL ACTIVITY ON THE MID-LATITUDE IONOSPHERE **c46**
Michel Blanc *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

The various physical processes which occur as a result of solar wind energy deposition on the magnetospheric cavity and thus the midlatitude ionosphere are discussed. Particular emphasis is placed on the complexed geometry of the various channels through which solar wind energy is transported within the magnetospheric cavity from the various dissipation regions of the ionosphere. R.C.T.

N81-23518# Auroral Observatory, Tromso (Norway).
CURRENTS IN THE AURORAL ZONE IONOSPHERE **c46**
Asgeir Brekke *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 9 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

A short outline of the evolution of the model current system at polar latitudes is given. The more recent observations of the Birkeland currents together with the ionospheric currents are interpreted in terms of a simplified current model, which is a current induced by the motion of plasma across the magnetic field lines in the magnetosphere. The amount of Joule heating released in the upper auroral atmosphere during strong auroral electrojets is related to the magnetic field perturbations on ground and it is shown that the amount of heat released is larger for a positive magnetic bay than for a negative bay of similar strength. M.G.

N81-23519# Auroral Observatory, Tromso (Norway).
NEUTRAL WINDS IN THE POLAR IONOSPHERE **c46**
Asgeir Brekke *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

Observations of the neutral air dynamics in the polar ionosphere are presented and a comparison with some of the present models of the neutral air global wind system is also made. The need for more research in this field is stressed. A few measurements do exist of this phenomenon which on one hand indicate the presence of local heat sources in the auroral zone and on the other a strong influence on the ion drag force. It is concluded that a better understanding of the neutral dynamics in the polar ionosphere is needed since it is generally accepted that the polar cap and auroral zone disturbances influence the neutral atmosphere dynamics at lower latitudes on a global scale. Futhermore the neutral dynamics at auroral heights are coupled to the magnetospheric processes and to the interplanetary space via the magnetic field. A better understanding of the sun-earth relationship can be obtained by studying the neutral atmosphere dynamics at high latitudes. M.G.

N81-23520*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for Planetary Atmospheres.
ELECTRICAL COUPLING BETWEEN THE LOWER ATMOSPHERE AND THE IONOSPHERE **c46**
Richard A. Goldberg *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01 CSCL 04A

The evidence for interactions between the ionosphere and troposphere is reviewed as a first step in establishing the role of electrical coupling between two regions. Upward processes appear to include the transfer of energy through gravity waves, or through the transmittance of VLF radio waves induced by lightning. In each case, the excitation of the upper atmosphere by tropospheric sources can stimulate feedback processes returning to the troposphere. Downward coupling involves changes in the global and local electrical structure of the atmosphere, and is often induced by solar activity. These effects are more direct and may possibly bypass the stratosphere. The responses in the atmospheric circuit to local changes are nearly instantaneous, and therefore are looked on with promise for possible influences on weather systems. Emerging experimental evidence indicates that atmospheric electric fields, especially at high latitudes and in the upper atmosphere, are responsive to solar and geomagnetic phenomena. Corpuscular radiations are known to strongly enhance the local atmospheric electrical conductivity and ionizations at stratospheric and mesospheric altitudes. Theories postulate that the electric field perturbations regulated by solar activity may be responsibile for the observed statistical correlations between solar activity and thunderstorms. M.G.

N81-23521# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
FIRST RESULTS FROM THE TROMSOE IONOSPHERIC MODIFICATION FACILITY **c46**
P. Stubbe, H. Kopka, A. Brekke, T. Hansen, O. Holt, R. L. Dowden, T. B. Jones, T. Robinson, H.-J. Lotz, and J. Waterman *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. Systems Feb. 1981 9 p refs Prepared in cooperation with Tromsoe Univ., Norway and Otago Univ., Dunedin, New Zealand and Leicester Univ., England and Goettingen Univ., West Germany (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

Preliminary experiments performed during the construction phase of the heating facility are surveyed. Experimental results relating to D region modification, generation of ELF and VLF waves by polar electrojet modulation, excitation of micropulsations, F region deformation, and anomalous absorption are briefly discussed. M.G.

N81-23522*# Boston Univ., Mass. School of Arts and Sciences.
A SUMMARY OF ROCKET-INDUCED IONOSPHERIC PERTURBATIONS **c46**
Michael Mendillo and Jeffrey Forbes *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 9 p refs Prepared in cooperation with Boston Coll., Mass. (For primary document see N81-23507 14-42)
(Contract NAS8-32844)
Avail: NTIS HC A17/MF A01 CSCL 04A

Observational evidence for artificially induced ionospheric modifications is briefly reviewed and the scientific and technological interest in induced ionospheric holes is discussed. M.G.

N81-23523*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
IONOSPHERIC COMPOSITION: THE SEASONAL ANOMALY EXPLAINED **c46**
D. G. Torr, P. G. Richards, and M. R. Torr (National Inst. for Telecommunications Research, Johannesburg, South Africa) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 15 p refs (For primary document see N81-23507 14-42)
(Contract NAS5-24331; Grant NSF ATM-80-05088)
Avail: NTIS HC A17/MF A01 CSCL 04A

The main photochemical processes of the ionosphere are reanalyzed in the light of laboratory measurements of rate coefficients, using the Atmosphere Explorer data. Major changes to the chemistry include the transfer of nearly all metastable O(+) ions to N2(+) via charge exchange with N2. The N2(+) ions become vibrationally excited by resonant fluorescence of solar near UV and near infrared radiation, leading to a return transfer of N2(+) ionization to O(+) by charge exchange or vibrationally excited N2(+) with atomic oxygen. With this chemistry the seasonal variations in the peak electron densities are then shown to be caused primarily by anomalous seasonal variations in neutral composition. The required neutral composition variations are empirically produced by the MSIS model atmosphere. The circulation derived from recent 3D models of the global thermosphere qualitatively accounts for the seasonal variations in neutral composition predicted by the MSIS model. In addition to the composition effect, vibrationally excited N2 is found to contribute a 20% effect to the anomalous seasonal behavior at solar maximum. M.G.

N81-23524# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
THERMOSPHERIC NEUTRAL COMPOSITION CHANGES

AND THEIR CAUSES **c46**
P. Bauer *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 6 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

The various types of thermospheric composition changes are defined and the mechanisms taking place are analyzed. In addition, the role played by molecular oxygen is shown. It appears clearly that the winter F region anomaly is associated with changes in thermospheric composition. In addition to purely dynamical effects driving an increase in atomic oxygen concentration over the winter hemisphere, it is shown that a large part of the anomaly seems to arise from molecular oxygen concentration changes induced by a combination of dynamical and photochemical effects. M.G.

N81-23525# Institut Royal Meteorologique de Belgique, Brussels.
RELATIONS BETWEEN SOLAR FLUX AND E-REGION PARAMETERS **c46**
Marcel Nicolet and Lucien Bossy *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 10 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

A detailed analyis of the behavior of the critical frequency of the E-layer with the variation of the solar flux at 10.7 cm leads to the possibility of an explanation of the simultaneous ionization by ultraviolet radiation (Lyman-Beta) and soft X-rays (30 to 100 A). The ratio of the X-radiation to the UV-radiation varying strongly with solar activity changes the ratio of the principal ions concentrations. Author

N81-23526*# Illinois Univ. at Urbana-Champaign. Aeronomy Lab.
ENERGETIC PARTICLE PRECIPITATION AT MIDDLE AND LOW LATITUDES **c46**
L. G. Smith and H. D. Voss *In* AGARD The Phys. Basis of the Ionosphere in the Terrest. System Feb. 1981 6 p refs (For primary document see N81-23507 14-42)
(Grant NGR-14-005-181)
Avail: NTIS HC A17/MF A01 CSCL 04A

The results from rocket observations of the nighttime electron density profile in the upper E region (120 to 200 km) over Wallops Island, Virginia are discussed. The observations demonstrated the importance of atmospheric tides in the formation of the intermediate layer near 150 km. These observations also show that, except perhaps on geomagnetically quiet nights, energetic particles are the dominant ionization source in the layer. Using rocket, satellite, and ground-based observations it is possible to study the global morphology of particle precipitation. It is found that, just as there are northern and southern auroral zones, there are also mid-latitude, low-latitude, and equatorial zones of precipitation. The evidence for these zones and the properties of the precipitating particles are summarized. M.G.

N81-23527*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
ENERGETIC O-POSITIVE PRECIPITATION: A SIGNIFICANT ENERGY **c47**
Marsha R. Torr, D. G. Torr, and R. Roble (National Center for Atmospheric Research, Boulder, Colo.) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
(Contracts NAS8-33992; NAS5-24331)
Avail: NTIS HC A17/MF A01 CSCL 04B

The interaction of O(+) ions with the thermophere and their subsequent history is described. The large scale effects of this precipitation are examined using a global thermospheric circulation model. A mechanism is suggested by which the energetic O(+) fluxes may be self-sustaining. M.G.

N81-23528# Institut fuer Astrophysik und Extraterrestrische Forschung, Bonn (West Germany).
ON THE MORPHOLOGY OF THE POLAR THERMOSPHERE **c46**
G. W. Proelss *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 8 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

The latitudinal structure and extension of the thermospheric disturbance zone generated by the solar wind/magnetospheric energy source is investigated using density data obtained by the polar orbiting satellite ESRO 4. A statistical analysis of ESRO 4 data reveals that (1) in the afternoon/evening sector the disturbance boundary coincides with the region of electric current dissipation along the auroral oval; (2) in the midnight/early morning sector dynamical effects extend the disturbance zone to lower latitudes and this expansion is strongly dependent on season and magnetic activity; and (3) in the late morning sector direct heating effects along the auroral oval are superimposed on the residuals of the early morning disturbance. These results are consistent with previous observations and provide boundary conditions for upper atmospheric models. M.G.

N81-23529# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
STRUCTURE OF ELECTRON TEMPERATURE **c46**
H. Thiemann *In its* The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 9 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

Electron density and temperature measurements of the retarding potential analyzer on board the AEROS-B satellite are analyzed in an altitude range from about 300 to 700 km for daytime conditions. The average temperature always displays the same qualitative pattern as a function of electron density and latitude for fixed altitudes. A model function describing this behavior is given. By means of this function the temperature response of the corresponding experimental data on seasonal as well as on hemispherical effects is discussed. M.G.

N81-23530*# Illinois Univ. at Urbana-Champaign. Aeronomy Lab.
MIDLATITUDE SPORADIC-E LAYERS **c46**
L. G. Smith and K. L. Miller *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 6 p refs (For primary document see N81-23507 14-42)
(Grant NGR-14-005-181)
Avail: NTIS HC A17/MF A01 CSCL 04A

Rocket borne probes and incoherent scatter radar were demonstrated to be effective methods of studying the structure of midlatitude sporadic E layers. Layers are formed when metal ions are converged vertically in a wind shear to produce a local enhancement of electron density. Rocket and radar observations show that the layers may occassionally have complex structure produced by an unstable wind shear. The partial transparency to radio waves of sporadic E layers is shown to be due to localized regions of high electron density. E.D.K.

N81-23531# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
THE SEASONAL AND GEOGRAPHICAL VARIATION OF EQUATORIAL SPREAD-F IRREGULARITIES INFLUENCED BY ATMOSPHERIC GRAVITY WAVES AND ELECTRIC FIELDS DUE TO THUNDERSTORMS **c46**
J. Roettger *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 3 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A18/MF A01

An empirical model is described which can explain features of large scale equatorial spread F irregularities. A correlation between the diurnal, seasonal, and geographical variation of spread F irregularities and convective thunderstorm activity is found. Originating mechanisms for this correlation are dynamical processes (convection) in the lower atmosphere; the coupling mechanisms are electric fields and atmospheric gravity waves. The empirical model, which bases on worldwide distribution of convective regions and empirical assumptions about ionospheric electric fields, does not claim to be exhaustive but can describe several typical features of the morphology of equatorial spread F irregularities. E.D.K.

N81-23532# Toulouse Univ. (France). Lab. de Sondages Electromagnetiques de l'environnement Terrestre.
PLASMA INSTABILITIES IN THE ELECTROJETS **c46**
M. Crochet *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs In FRENCH; ENGLISH summary (For primary document see N81-23507 14-42)

Avail: NTIS HC A17/MF A01

The electron density irregularities embedded in the equatorial and auroral electrojets are associated with plasma instability phenomena (two stream and cross field instabilities). These irregularities extensively investigated using VHF and UHF radars and more recently HF radars, at the equator and in the auroral zone, are often used as tracers of the electron velocity and the electric field in the electrojets. A number of recent experimental results obtained in the equatorial electrojet in Africa with HF radar are presented: long wavelengths measurements and counter electrojet observations. At the light of these experimental results a classification of the electrojet plasma instabilities is proposed. Threshold conditions and saturation of the instabilities are discussed for different equatorial and auroral configurations as the validity of electric field measurements. E.D.K.

N81-23533# Oslo Univ. (Norway).

DYNAMICS OF THE DAYSIDE CUSP AURORA **c46**

A. Egeland, P. E. Sandholt, K. Henriksen, C. S. Deehr, and G. G. Sivjee *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 8 p refs Prepared in cooperation with Tromsoe Univ., Norway and Alaska Univ., Fairbanks (For primary document see N81-23507 14-42)

Avail: NTIS HC A17/MF A01

A multi national auroral project for investigations of the dayside cusp aurora from Svalbard was begun the winter of 1978/79. The characteristics of the cusp emission were studied and the results are summarized. The occurrence and duration of discrete auroral forms superimposed on the weak permanent 630 nm belt were not previously separated from the clean cusp aurora. Special attention is given to the dynamics of the dayside cusp aurora and the simultaneous occurring aurora in the night sector in relation to the dayside and nightside magnetic activity. The conclusion is that a dayside current system exists and that it is associated with the position of the cusp aurora. The intensity and movements of this current system are correlated with the nightside electrojet. It is suggested that a discontinuity similar to the Harang discontinuity exists in the dayside cusp around magnetic noon. E.D.K.

N81-23534*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

LARGE-SCALE WAVES IN THE IONOSPHERE OBSERVED BY THE AE SATELLITE **c46**

S. H. Gross (Polytechnic Inst. of New York, Farmingdale), C. A. Reber, and F. Huang (Computer Sciences Corp., Silver Spring, Md.) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 10 p refs (For primary document see N81-23507 14-42)

Avail: NTIS HC A17/MF A01 CSCL 04A

Atmospheric Explorer (AE) satellite data were used to establish whether coherent waves in the gravity wave range are present in both neutral and ionized media in the thermosphere. The AE-C data in particular are shown. Data consist of the in situ argon, helium, nitrogen, and oxygen densities, plasma density, and ion and electron temperatures. Filtering provides the fluctuation signals for each which are spectrum analyzed for power and cross spectra. The observed frequencies are essentially proportional to the spatial wavenumbers along the satellite track. Scale sizes range from thousands to tens of kilometers. E.D.K.

N81-23535# Leicester Univ. (England). Dept. of Physics.

THE GENERATION AND PROPAGATION OF ATMOSPHERIC GRAVITY WAVES WITH SPECIAL REFERENCE TO RADIO PROPAGATION **c32**

T. B. Jones *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 14 p refs (For primary document see N81-23507 14-42)

Avail: NTIS HC A17/MF A01

The characteristics of the propagation of internal gravity waves in the upper atmosphere can be derived from a consideration of the hydrostatic equations. These are shown to be consistent with the wave like disturbances in the ionosphere known as travelling ionospheric disturbances (TIDs). The two main classes of TIDs observed experimentally can be identified with two independent solutions of the gravity wave equations. Possible sources of the gravity waves were considered and the disturbances resulting from a point impulsive source in the atmosphere are consistent with the measured parameteres of TIDs. The changes in electron density distributions in the ionosphere during TID activity were described in detail and their influence on radio systems ranging from HF to UHF considered. E.D.K.

N81-23536# University Coll. of Wales, Aberystwyth. Dept. of Physics.

PREDICTION TECHNIQUES FOR FORTHCOMING SOLAR MAXIMA **c92**

G. M. Brown *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)

Avail: NTIS HC A17/MF A01

The various techniques used to predict the magnitude of a forthcoming sunspot maximum are reviewed. Details of individual methods are not considered, but full bibliographical references are given. Most of the techniques are discussed in relation to their applications to the current solar cycle number 21. During the last decade there was substantial improvement in prediction abilities arising from the realization that a solar cycle is being built up for several years prior to its conventional beginning at sunspot minimum. This means that information about the nature and size of an up coming cycle must be contained in both solar and terrestrial data obtained during the declining phase of an old cycle and around the minimum. Various prediction applications of this principle are discussed which show considerable promise. These methods break ground in having a degree of physical backing rather than being purely empirical or dependent on the existence of periodicities in the sunspot number time series. E.D.K.

N81-23537# Science Research Council, Slough (England). Rutherford and Appleton Labs.

IONOSPHERIC PREDICTIONS FOR HF RADIO SYSTEMS: THE FUTURE **c32**

P. A. Bradley and M. Lockwood *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 13 p refs (For primary document see N81-23507 14-42)

Avail: NTIS HC A17/MF A01

Current prediction procedures are reviewed briefly and the uses for which they are needed are considered. Examples are presented of requirements for long term, short term, and storm propagation predictions. Desirable and likely future improvements in knowlege of ionospheric morphology leading to more accurate predictions are discussed. Specific suggestions are made for extended prediction procedures to aid optimization of communication systems. These involve estimates of additional parameters and improved representations of other factors. In particular, predictions of background interference, signal dispersion and error rates are proposed. E.D.K.

N81-23538*# Pennsylvania State Univ., University Park. Ionosphere Research Lab.

ULTIMATE LIMITS TO ERROR PROBABILITIES FOR IONOSPHERIC MODELS BASED ON SOLAR GEOPHYSICAL INDICES AND HOW THESE COMPARE WITH THE STATE OF THE ART **c92**

J. S. Nisbet and C. G. Stehle *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)

(Grants NSG-5212; NGL-39-009-003)

Avail: NTIS HC A17/MF A01 CSCL 03B

An ideal model based on a given set of geophysical indices is defined as a model that provides a least squares fit to the data set as a function of the indices considered. Satellite measurements of electron content for three stations at different magnetic latitudes were used to provide such data sets which were each fitted to the geophysical indices. The magnitude of the difference between the measured value and the derived equation for the data set was used to estimate the probability of making an error greater than a given magnitude for such an ideal model. Atmospheric Explorer C data is used to examine the causes of the fluctuations and suggestions are made about how real improvements can be made in ionospheric forecasting ability. Joule heating inputs in the auroral electrojets are related to the AL and AU magnetic indices. Magnetic indices based on the time integral of the energy deposited in the electrojets are

proposed for modeling processes affected by auroral zone heating. E.D.K.

N81-23539# Freiburg Univ. (West Germany).
THE DAY-BY-DAY VARIABILITY OF THE IONOSPHERIC PEAK DENSITY c46
K. Rawer, E. Harnischmacher, and R. Eyfrig *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

In order to extend the present monthly ionospheric prediction schedule to daily predictions, different causes of day by day variability are discussed. The effect of lunar tides is shown to be predictable. It is particulaly important at certain hours. E.D.K.

N81-23540# Leicester Univ. (England). Dept. of Physics.
EXPERIMENTAL VALIDATION OF THE ONSOD OMEGA PREDICTION METHOD c46
T. B. Jones and K. Mowforth *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 19 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

A detailed analysis of the experimentally determined performance of the Omega system at three locations within the United Kingdom is presented. The predicted performance of the system was obtained using Omega navigation System Operations detail program. The validity of these line of position (LOP) corrections for the three locations was assessed and their diurnal and seasonal variations quantified. The variation in performance of Omega at the three receiver sites was studied by examining the difference in the measured error of the same LOP at the three locations. E.D.K.

N81-23541# Istituto Nazionale di Geofisica, Rome (Italy). Ionospheric Dept.
SOME CONSIDERATIONS UPON MODELS FOR IONOSPHERIC RADIO COMMUNICATIONS FORECASTING c46
P. Dominici and B. Zolesi *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 16 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

The ionospheric radio communications exhibit, along with consistent advantages, the well known disadvantage that the essential parameters show large variations which must be forecast. By appropriate models, some of these variations are reconductible to known behaviors of solar and geophysical quantities and are therefore foreseeable with satisfactory statistical accuracy; on the contrary, other variations are completey casual. A brief discussion of the differing points of view concerning ionospheric modelling is included. E.D.K.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N81-23542*# Geological Survey, Malaysia. Water Resources Div.
IMPROVING STREAMFLOW ESTIMATES THROUGH THE USE OF LANDSAT
Gregory J. Allord, Principal Investigators and Frank L. Scarpace (Wisconsin-Madison Univ.) [1981] 16 p refs Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198
ERTS
(E81-10129; NASA-CR-164119) Avail: NTIS HC A02/MF A01 CSCL 08H

Estimates of low flow and flood frequency in several southwestern Wisconsin basins were improved by determining land cover from LANDSAT imagery. With the use of estimates of land cover in multiple-regression techniques, the standard error of estimate (SE) for the least annual 7-day low flow for 2- and 10-year recurrence intervals of ungaged sites were lowered by 9% each. The SE of flood frequency in the 'Driftless Area' of Wisconsin for 10-, 50-, and 100-year recurrence intervals were lowered by 14%. Four of nine basin characteristics determined from satellite imagery were significant variables in the multiple-regression techniques, whereas only 1 of the 12 characteristics determined from topographic maps was significant. The percentages of land cover categories in each basin were determined by merging basin boundaries, digitized from quadrangles, with a classified LANDSAT scene. Both the basin boundary X-Y polygon coordinates and the satellite coordinates were converted to latitude-longitude for merging compatibility. T.M.

N81-23543*# Science and Education Administration, Weslaco, Tex.
PLANT COVER, SOIL TEMPERATURE, FREEZE, WATER STRESS, AND EVAPOTRANSPIRATION CONDITIONS Final Report, 1 Dec. 1977 - Sep. 1980
Craig L. Wiegand, Paul R. Nixon, Harold W. Gausman, L. Neal Namken, Ross W. Leamer, and Arthur J. Richardson, Principal Investigators Feb. 1981 183 p refs Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20771. Domestic users send orders to 'Attn: National Space Science Data Center'; non-domestic users send orders to 'Attn: World Data Center A for Rockets and Satellites'. HCMM
(NASA Order S-40198-B)
(E81-10130; NASA-CR-164120) Avail: NTIS HC A09/MF A01 CSCL 02C

Emissive and reflective data for 10 days, and IR data for 6 nights in south Texas scenes were analyzed after procedures were developed for removing cloud-affected data. HCMM radiometric temperatures were: within 2 C of dewpoint temperatures on nights when air temperature approached dewpoint temperatures; significantly correlated with variables important in evapotranspiration; and, related to freeze severity and planting depth soil temperatures. Vegetation greenness indexes calculated from visible and reflective IR bands of NOAA-6 to -9 meteorological satellites will be useful in the AgRISTARS program for seasonal crop development, crop condition, and drought applications. T.M.

N81-23544*# Texas A&M Univ., College Station. Remote Sensing Center.
DRYLAND PASTURE AND CROP CONDITIONS AS SEEN BY HCMM Progress Report, Jul. - Oct. 1980
W. D. Rosenthal, J. C. Harlan, and Bruce J. Blanchard, Principal Investigators Oct. 1980 16 p Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20771. Domestic users send orders to 'Attn: National Space Science Data Center'; non-domestic users send orders to 'Attn: World Data Center A for Rockets and Satellites'. HCMM
(Contract NAS5-24383)
(E81-10131; NASA-CR-164121; PR-3712-11) Avail: NTIS HC A02/MF A01 CSCL 02C

Infrared data of the Wahita River watershed were screened to include areas having greater than 60% pasture. This improved the July 24/July 13 and October 5/August 30 temperature/antecedent precipitation index (API) relationships, but the coefficient of determination was not improved in the July 29/July 13 relationship. Surface temperatures were recalculated using the atmospheric correction factor calculated by the modified RADTRA model. In all cases the correction factor was reduced. The model estimate and lake surface temperatures may be used to calculate IR data if no meteorological data is available. Day/day surface temperature differences from HCMM were related to the API up to approximately seven days after a storm on July 21, 1978. After that period, the coefficient of determination decreased to 0.25 indicating other factors, such as land-use variability within each measurement site (5 square kilometers), are influencing temperature variation. Other data sets need to be analyzed to confirm the temperature difference API sensitivity period. A.R.H.

N81-23545*# Michigan State Univ., East Lansing. Dept. of Forestry.
AN EVALUATION OF SATELLITE DATA FOR ESTIMATING THE AREA OF SMALL FORESTLAND IN THE SOUTHERN LOWER PENINSULA OF MICHIGAN Ph.D. Thesis

Michael Apostolos Karteris, Principal Investigator 1980 200 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Grant NGL-23-004-083)
(E81-10136; NASA-CR-164139) Avail: NTIS HC A09/MF A01 CSCL 02F

A winter black and white band 5, a winter color, a fall color, and a diazo color composite of the fall scene were used to assess the use and potential of LANDSAT images for mapping and estimating acreage of small scattered forest tracts in Barry County, Michigan. Forests as small as 2.5 acres were mapped from each LANDSAT data source. The maps for each image were compared with an available forest-type map. Mapping errors detected were categorized as boundary and identification errors. The most frequently misclassified areas were agriculture lands, treed-bogs, brushlands and lowland and mixed hardwood stands. Stocking level affected interpretation more than stand size. The overall level of the interpretation performance was expressed through the estimation of classification, interpretation, and mapping accuracies. These accuracies ranged from 74 between 74% and 98%. Considering errors, accuracy, and cost, winter color imagery is the best LANDSAT alternative for mapping small forest tracts. However, since the availability of cloud-free winter images of the study area is significantly lower than images for other seasons, a diazo enhanced image of a fall scene is recommended as the best next best alternative. A.R.H.

N81-23546*# Geological Survey, Reston, Va.
HEAT CAPACITY MAPPING MISSION (HCMM) THERMAL SURFACE WATER MAPPING AND ITS CORRELATION TO LANDSAT
Alden P. Colvocoresses, Principal Investigator 3 Mar. 1980 4 p Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20771. Domestic users send orders to 'Attn: National Space Science Data Center"; non-domestic users send orders to 'Attn: World Data Center A for Rockets and Satellites". HCMM
(E81-10137; NASA-CR-164145) Avail: NTIS HC A02/MF A01 CSCL 05B

Graphics are presented which show HCMM mapped water-surface temperature in Lake Anna, a 13,000 dendrically-shaped lake which provides cooling for a nuclear power plant in Virginia. The HCMM digital data, produced by NASA were processed by NOAA/NESS into image and line-printer form. A LANDSAT image of the lake illustrates the relationship between MSS band 7 data and the HCMM data as processed by the NASA image processing facility which transforms the data to the same distortion-free hotline oblique Mercator projection. Spatial correlation of the two images is relatively simple by either digital or analog means and the HCMM image has a potential accuracy approaching the 80 m of the original LANDSAT data. While it is difficult to get readings that are not diluted by radiation from cooler adjacent land areas in narrow portions of the lake, digital data indicated by the line-printer display five different temperatures for open-water areas. Where the water surface response was not diluted by land areas, the temperature difference recorded by HCMM corresponds to in situ readings with rsme on the order of 1 C. A.R.H.

N81-23547*# Kansas Univ., Lawrence. Space Technology Center.
CROP PHENOLOGY AND LANDSAT-BASED IRRIGATED LANDS INVENTORY IN THE HIGH PLAINS Interim Report, 1 Sep. - 30 Nov. 1980
E. A. Martinko, Principal Investigator, J. Poracsky, E. R. Kipp, and H. Krieger 30 Nov. 1980 34 p ERTS
(Grant NAG2-57)
(E81-10138; NASA-CR-164146; IR-1) Avail: NTIS HC A03/MF A01 CSCL 02C

The activity concentrated on identifying crop and irrigation data sources for the eight states within the High Plains Aquifer and making contacts concerning the nature of these data. A mail questionnaire was developed to gather specific data not routinely reported through standard data collection channels. Input/output routines were designed for High Plains crop and irrigation data and initial statistical data on crops were input to computer files. T.M.

N81-23548*# Kansas Univ., Lawrence. Space Technology Center.
CROP-PHENOLOGY AND LANDSAT-BASED IRRIGATED LANDS INVENTORY IN THE HIGH PLAINS Interim Report, 1 Dec. 1980 - 31 Jan. 1981
E. A. Martinko, Principal Investigator, J. Poracsky, E. R. Kipp, and H. Krieger 31 Jan. 1981 48 p ERTS
(Grant NAGw-57)
(E81-10139; NASA-CR-164147; IR-2) Avail: NTIS HC A03/MF A01 CSCL 02C

Optimal LANDSAT image dates for 1980 were identified based on the weekly crop-weather reports for Colorado, New Mexico, South Dakota, Texas, Oklahoma, Kansas, Nebraska, and Wyoming. The 1979 agricultural statistics data were entered into computer files and a revised questionnaire was developed and mailed to ASCS county agents. A set of computer programs was developed to allow the preparation of computer-assisted graphic displays of much of the collected data. T.M.

N81-23549*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
MULTISTAGE VARIABLE PROBABILITY FOREST VOLUME INVENTORY
James E. Anderson, Principal Investigator Mar. 1979 32 p refs ERTS
(E81-10140; NASA-TM-82327; Rept-179) Avail: NTIS HC A03/MF A01 CSCL 08F

An inventory scheme based on the use of computer processed LANDSAT MSS data was developed. Output from the inventory scheme provides an estimate of the standing net saw timber volume of a major timber species on a selected forested area of the Navajo Nation. Such estimates are based on the values of parameters currently used for scaled sawlog conversion to mill output. The multistage variable probability sampling appears capable of producing estimates which compare favorably with those produced using conventional techniques. In addition, the reduction in time, manpower, and overall costs lend it to numerous applications. T.M.

N81-23550*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
WESTERN ENERGY RELATED OVERHEAD MONITORING PROJECT. PHASE 2: SUMMARY Progress Report, 1 Jan. 1977 - 30 Jun. 1978
James E. Anderson, Principal Investigator Jan. 1979 113 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E81-10141; NASA-TM-82328; Rept-176) Avail: NTIS HC A06/MF A01 CSCL 08F

Assistance by NASA to EPA in the establishment and maintenance of a fully operational energy-related monitoring system included: (1) regional analysis applications based on LANDSAT and auxiliary data; (2) development of techniques for using aircraft MSS data to rapidly monitor site specific surface coal mine activities; and (3) registration of aircraft MSS data to a map base. The coal strip mines used in the site specific task were in Campbell County, Wyoming; Big Horn County, Montana; and the Navajo mine in San Juan County, New Mexico. The procedures and software used to accomplish these tasks are described. A.R.H.

N81-23551*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
INDENTIFYING ENVIRONMENTAL FEATURES FOR LAND MANAGEMENT DECISIONS Annual Report
31 Oct. 1980 10 p ERTS
(Grant NAGw-95)
(E81-10142; NASA-CR-164148) Avail: NTIS HC A02/MF A01 CSCL 08B

The wetlands and water-related land use in the Uinta Basin were classified and mapped using photointerpretation of U-2 infrared photography and digital LANDSAT data. The digital maps were used to augment photointerpretations. A highly effective diagnostic tool emerged when the LANDSAT digital print was

photoreduced to a film positive at the same scale as the U-2 film and overlain on the U-2 color film. As a result of this merging technique, cover types can be identified more accurately and probablistic statements can be made about the relative amounts of water being consumed in one pasture vs. another. The hazards to urban development on sensitive and unstable land in the foothills of Davis County were studied using NASA U-2 photography. Shoreline fluctuations were mapped in the Farmington Bay using LANDSAT digital data. T.M.

N81-23552# Comptroller General of the United States, Washington, D.C.
OIL AND NATURAL GAS FROM ALASKA, CANADA, AND MEXICO: ONLY LIMITED HELP FOR US Report to the Congress
11 Sep. 1980 93 p refs
(EMD-80-72) Avail: NTIS HC A05/MF A01

The potential effect of Alaskan, Canadian, and Mexican oil and gas development on the U.S. domestic energy situation and energy policies is assessed. Particular emphasis is given to factors affecting the willingness and ability of Canada and Mexico to provide increased quantities of these resources to the United States and to factors delaying further oil and gas exploration and development in Alaska. A.R.H.

N81-23553*# California Univ., Berkeley.
REMOTE SENSING OF WATER QUALITY IN RESERVOIRS AND LAKES IN SEMI-ARID CLIMATES Final Report
Harold M. Anderson and Alexander J. Horne Dec. 1975 143 p refs
(Grant NsG-2003)
(NASA-CR-166178; SERL-75-1) Avail: NTIS HC A07/MF A01 CSCL 08H

Overlake measurements using aerial cameras (remote sensing) combined with water truth collected from boats most economically provided wide-band photographs rather than precise spectra. With use of false color infrared film (400-950 nm), the reflected spectral signatures seen from hundreds to thousands of meters above the lake merged to produce various color tones. Such colors were easily and inexpensively obtained and could be recognized by lake management personnel without any prior training. The characteristic spectral signatures of various algal types were also recognizable in part by the color tone produced by remote sensing. T.M.

N81-23554*# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
THERMAL POLLUTION MATH MODEL. VOLUME 1: THERMAL POLLUTION MODEL PACKAGE VERIFICATION AND TRANSFER Final Report
Samuel S. Lee and Subrata Sengupta Nov. 1980 25 p refs Sponsored in part by EPA 7 Vol.
(Contract NAS10-9410)
(NASA-CR-165623-Vol-1; TR-43-4-Vol-1) Avail: NTIS HC A02/MF A01 CSCL 13B

Two three dimensional, time dependent models, one free surface, the other rigid lid, were verified at Anclote Anchorage and Lake Keowee respectively. The first site is a coastal site in northern Florida; the other is a man-made lake in South Carolina. These models describe the dispersion of heated discharges from power plants under the action of ambient conditions. A one dimensional, horizontally-averaged model was also developed and verified at Lake Keowee. The data base consisted of archival in situ measurements and data collected during field missions. The field missions were conducted during winter and summer conditions at each site. Each mission consisted of four infrared scanner flights with supporting ground truth and in situ measurements. At Anclote, special care was taken to characterize the complete tidal cycle. The three dimensional model results compared with IR data for thermal plumes on an average within 1 C root mean square difference. The one dimensional model performed satisfactorily in simulating the 1971-1979 period. J.M.S.

N81-23555*# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
THERMAL POLLUTION MATH MODEL. VOLUME 2: VERIFICATION OF ONE-DIMENSIONAL NUMERICAL MODEL AT LAKE KEOWEE Final Report
Samuel S. Lee, Subrata Sengupta, and Emmanuel V. Nwadike Aug. 1980 147 p refs Sponsored in part by EPA 7 Vol.
(Contract NAS10-9410)
(NASA-CR-165623-Vol-2; TR-43-4-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 13B

A one dimensional model for studying the thermal dynamics of cooling lakes was developed and verified. The model is essentially a set of partial differential equations which are solved by finite difference methods. The model includes the effects of variation of area with depth, surface heating due to solar radiation absorbed at the upper layer, and internal heating due to the transmission of solar radiation to the sub-surface layers. The exchange of mechanical energy between the lake and the atmosphere is included through the coupling of thermal diffusivity and wind speed. The effects of discharge and intake by power plants are also included. The numerical model was calibrated by applying it to Cayuga Lake. The model was then verified through a long term simulation using Lake Keowee data base. The comparison between measured and predicted vertical temperature profiles for the nine years is good. The physical limnology of Lake Keowee is presented through a set of graphical representations of the measured data base. J.M.S.

N81-23556*# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
THERMAL POLLUTION MATHEMATICAL MODEL. VOLUME 3: USER'S MANUAL FOR ONE-DIMENSIONAL NUMERICAL MODEL FOR THE SEASONAL THERMOCLINE Final Report
Samuel S. Lee, Subrata Sengupta, and Emmanuel V. Nwadike Aug. 1980 56 p refs Sponsored in part by EPA 7 Vol.
(Contract NAS10-9410)
(NASA-CR-165623-Vol-3; TR-43-4-Vol-3) Avail: NTIS HC A04/MF A01 CSCL 13B

A user's manual for a one dimensional thermal model to predict the temperature profiles of a deep body of water for any number of annual cycles is presented. The model is essentially a set of partial differential equations which are solved by finite difference methods using a high speed digital computer. The model features the effects of area change with depth, nonlinear interaction of wind generated turbulence and buoyancy, adsorption of radiative heat flux below the surface, thermal discharges, and the effects of vertical convection caused by discharge. The main assumption in the formulation is horizontal homogeneity. The environmental impact of thermal discharges from power plants is emphasized. Although the model is applicable to most lakes, a specific site (Lake Keowee, S.C.) application is described in detail. The programs are written in FORTRAN 5. J.M.S.

N81-23557*# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
THERMAL POLLUTION MATHEMATICAL MODEL. VOLUME 4: VERIFICATION OF THREE-DIMENSIONAL RIGID-LID MODEL AT LAKE KEOWEE Final Report
Samuel S. Lee, Subrata Sengupta, Emmanuel V. Nwadike, and Sumon K. Sinha Aug. 1980 102 p refs Sponsored in part by EPA 7 Vol.
(Contract NAS10-9410)
(NASA-CR-165623-Vol-4; TR-43-4-Vol-4) Avail: NTIS HC A06/MF A01 CSCL 13B

The rigid lid model was developed to predict three dimensional temperature and velocity distributions in lakes. This model was verified at various sites (Lake Belews, Biscayne Bay, etc.) and th verification at Lake Keowee was the last of these series of verification runs. The verification at Lake Keowee included the following: (1) selecting the domain of interest, grid systems, and comparing the preliminary results with archival data; (2) obtaining actual ground truth and infrared scanner data both for summer and winter; and (3) using the model to predict the measured data for the above periods and comparing the predicted results with the actual data. The model results compared well with measured data. Thus, the model can be used as an effective predictive tool for future sites. J.M.S.

N81-23558*# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
THERMAL POLLUTION MATHEMATICAL MODEL

VOLUME 5: USER'S MANUAL FOR THREE-DIMENSIONAL RIGID-LID MODEL Final Report
Samuel S. Lee, Subrata Sengupta, Emmanuel V. Nwadike, and Sumon K. Sinha Aug. 1980 154 p refs Sponsored in part by EPA 7 Vol.
(Contract NAS10-9410)
(NASA-CR-165623-Vol-5; TR-43-4-Vol-5) Avail: NTIS HC A08/MF A01 CSCL 13B

A user's manual for a three dimensional, rigid lid model used for hydrothermal predictions of closed basins subjected to a heated discharge together with various other inflows and outflows is presented. The model has the capability to predict (1) wind driven circulation; (2) the circulation caused by inflows and outflows to the domain; and (3) the thermal effects in the domain, and to combine the above processes. The calibration procedure consists of comparing ground truth corrected airborne radiometer data with surface isotherms predicted by the model. The model was verified for accuracy at various sites and results are found to be fairly accurate in all verification runs. J.M.S.

N81-23559*# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
THERMAL POLLUTION MATHEMATICAL MODEL. VOLUME 6: VERIFICATION OF THREE-DIMENSIONAL FREE-SURFACE MODEL AT ANCLOTE ANCHORAGE Final Report
Samuel S. Lee, Subrata Sengupta, S. Y. Tuann, and C. R. Lee Aug. 1980 123 p refs Sponsored in part by EPA 7 Vol.
(Contract NAS10-9410)
(NASA-CR-165623-Vol-6; TR-43-4-Vol-6) Avail: NTIS HC A06/MF A01 CSCL 13B

The free-surface model presented is for tidal estuaries and coastal regions where ambient tidal forces play an important role in the dispersal of heated water. The model is time dependent, three dimensional, and can handle irregular bottom topography. The vertical stretching coordinate is adopted for better treatment of kinematic condition at the water surface. The results include surface elevation, velocity, and temperature. The model was verified at the Anclote Anchorage site of Florida Power Company. Two data bases at four tidal stages for winter and summer conditions were used to verify the model. Differences between measured and predicted temperatures are on an average of less than 1 C. J.M.S.

N81-23560*# Miami Univ., Coral Gables, Fla. Dept. of Mechanical Engineering.
THERMAL POLLUTION MATHEMATICAL MODEL. VOLUME 7: USER'S MANUAL FOR THREE-DIMENSIONAL FREE-SURFACE MODEL Final Report
Samuel S. Lee, Subrata Sengupta, S. Y. Tuann, and C. R. Lee Aug. 1980 152 p refs 7 Vol.
(Contract NAS10-9410)
(NASA-CR-165623-Vol-7; TR-43-4-Vol-7) HC A08/MF A01 CSCL 13B

A mathematical model used for the analysis of thermal discharge from power plants into tidal estuaries and coastal waters is described. This transient, free surface, three dimensional model is applied to predict the water temperature as a function of time and position in a specified region. In situations of practical relevance, the specified coastal or off-shore region will be a water body of irregular bottom topography with possible islands or keys. The user specifies the boundary and boundary conditions, as well as the water depth distribution. Semi-diurnal tide is considered in the model. Hourly weather data is needed for wind stress calculation and heat exchange between water and the atmosphere. The ambient temperature is assumed of a sinusoidal form of 24 hour period. The ambient turbulence is included by an eddy viscosity and diffusivity formulation. The appropriate values are to be calibrated against measured currents. J.M.S.

N81-23561*# Texas A&M Univ., College Station. Dept. of Mathematics.
BASIC RESEARCH PLANNING IN MATHEMATICAL PATTERN RECOGNITION AND IMAGE ANALYSIS Final Report
Jack Bryant and L. F. Guseman, Jr. Jan. 1981 77 p refs
(Contract NAS9-15964)
(NASA-CR-160946) Avail: NTIS HC A05/MF A01 CSCL 05B

Fundamental problems encountered while attempting to develop automated techniques for applications of remote sensing are discussed under the following categories: (1) geometric and radiometric preprocessing; (2) spatial, spectral, temporal, syntactic, and ancillary digital image representation; (3) image partitioning, proportion estimation, and error models in object scene interference; (4) parallel processing and image data structures; and (5) continuing studies in polarization; computer architectures and parallel processing; and the applicability of 'expert systems' to interactive analysis. A.R.H.

N81-23562*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AN INTRODUCTION TO THE INTERIM DIGITAL SAR PROCESSOR AND THE CHARACTERISTICS OF THE ASSOCIATED SEASAT SAR IMAGERY
C. Wu, B. Barkan, B. Huneycutt, C. Leang, and S. Pang 1 Apr. 1981 123 p refs
(Contract NAS7-100)
(NASA-CR-164279; JPL-Pub-81-26) Avail: NTIS HC A06/MF A01 CSCL 08B

Basic engineering data regarding the Interim Digital SAR Processor (IDP) and the digitally correlated Seasat synthetic aperature radar (SAR) imagery are presented. The correlation function and IDP hardware/software configuration are described, and a preliminary performance assessment presented. The geometric and radiometric characteristics, with special emphasis on those peculiar to the IDP produced imagery, are described. J.D.H.

N81-23563*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MODELING MISREGISTRATION AND RELATED EFFECTS ON MULTISPECTRAL CLASSIFICATION
Fred C. Billingsley 15 Apr. 1981 89 p refs
(Contract NAS7-100)
(NASA-CR-164282; JPL-Pub-81-6) Avail: NTIS HC A05/MF A01 CSCL 08B

The effects of misregistration on the multispectral classification accuracy when the scene registration accuracy is relaxed from 0.3 to 0.5 pixel are investigated. Noise, class separability, spatial transient response, and field size are considered simultaneously with misregistration in their effects on accuracy. Any noise due to the scene, sensor, or to the analog/digital conversion, causes a finite fraction of the measurements to fall outside of the classification limits, even within nominally uniform fields. Misregistration causes field borders in a given band or set of bands to be closer than expected to a given pixel, causing additional pixels to be misclassified due to the mixture of materials in the pixel. Simplified first order models of the various effects are presented, and are used to estimate the performance to be expected. J.D.H.

N81-23564# Battelle Columbus Labs., Durham, N. C.
SOILS OF ISRAEL AND THEIR SIMILARITY TO SOILS OF THE UNITED STATES Final Report
LeRoy A. Daugherty Jan. 1981 122 p refs Prepared in cooperation with New Mexico State Univ., Las Cruces
(Contract DAAG29-76-D-0100; DA Proj. 1L1-62111-AH-71) (AD-A097528; ERADCOM/ASL-CR-81-0100-1) Avail: NTIS HC A06/MF A01 CSCL 08/13

This report compares the soils of Israel, particularly those of the Negev, with various sites in the southwestern United States. Comparison is made on the basis of agricultural maps because of the general availability of this type of information on a world wide basis. Even though the soil mapping units are in agricultural terms, they have been successfully used for nonagricultural purposes. Author (GRA)

N81-23565# Environmental Research Inst. of Michigan, Ann Arbor. Radar and Optics Div.
DETERMINATION OF BACKSCATTER CHARACTERISTICS OF SEA ICE USING SYNTHETIC APERTURE RADAR DATA Final Report, 1 Jul. 1979 - 31 Aug. 1980
Richard W. Larson, James D. Lyden, Robert A. Shuchman, and Ray T. Lowry Mar. 1981 198 p refs

(Contract N00014-79-C-0690)
(AD-A097341; ERIM-142600-1-F) Avail: NTIS HC A09/MF A01 CSCL 17/9

Data sets obtained from sea ice test sites in the Beaufort Sea as part of Canada's SURSAT program and from SAR-77 flights over the Labrador Sea were analyzed. A synthetic aperture radar system operating simultaneously at 3 cm and 23 cm wavelengths with two orthogonal polarization receivers provided the imagery. Ground truth was also available. The SAR data were converted into digital image format and four basic measurements made on the data from each test site: (1) mean value, (2) standard deviation, (3) histogram, and (4) relative power scans at constant range lines. The results are presented in several formats: (1) cluster plots, (2) variance versus ice type, (3) coefficient of variation, and (4) two measures of the polarization ratio. Relative values of backscatter coefficients for several ice types are compared, but absolute values cannot be obtained. GRA

N81-23566# Arizona Univ., Tucson. Digital Image Analysis Lab.
AUTOMATIC METHODS IN IMAGE PROCESSING AND THEIR RELEVANCE TO MAP-MAKING Final Report
B. R. Hunt 11 Feb. 1981 226 p refs
(Contract DAAG29-77-G-0175)
(AD-A097377; SIE/DIAL-81-002; ARO-14782.1-GS) Avail: NTIS HC A11/MF A01 CSCL 08/2

The behavior of digital cross-correlation algorithms as applied to image matching problems is examined in terms of the relationship between measurable image properties and algorithm characteristics. Statistical image quality measures are developed which could be employed in a preprocessor to predict the performance of automatic stereo-compilation equipment. The measures include quantity derived from the Cramer-Rao lower bound on the variance of any unbiased parameter estimator, various contrast measures such as variance, contrast modulation, and median absolute deviation, and a stationarity detector related to the variance gradient. These measures are based on image and correlator models which describe the behavior of correlation processors under conditions of low image contrast or signal-to-noise ratio, geometric distortion, and image nonstationarity. Computer simulations using synthetic imagery were performed to verify the various models, and indicate the potential for the use of image quality measures in the predicting of correlation behavior. Implications of the models in terms of correlation processor design and implementation are discussed. Author (GRA)

N81-23567# Rome Research Corp., N. Y.
RECONNAISSANCE SENSOR SYSTEM EXPLOITATION Final Technical Report, 1 Nov. 1978 - 17 Nov. 1980
Richard R. Petroski Jan. 1981 117 p refs
(Contract F30602-78-C-0332; AF Proj. 4594)
(AD-A097224; RRC-80-8; RADC-TR-80-400) Avail: NTIS HC A06/MF A01 CSCL 14/5

Evaluations of reconnaissance sensor imagery and ground exploitation systems performed under the program are summarized. The support provided by the Northeast Test Area and the Military Equipment and Engineering Array (MEDEA) at the RADC Stockbridge Test Site is documented. GRA

N81-23568# North Dakota Univ., Grand Forks. Engineering Experiment Station.
EVALUATION OF HYDROTHERMAL RESOURCES OF NORTH DAKOTA, PHASE 1 Final Technical Report
Kenneth L. Harris, Laramie M. Winczewski, Howard R. Umphrey, and Sidney B. Anderson 1 Apr. 1980 181 p refs
(Contract DE-FC07-79ID-012030)
(DOE/ID-12030/12) Avail: NTIS HC A09/MF A01

An analysis of existing data on file with the North Dakota Geological Survey (NDGS) and other state and federal agencies is made. The principle source of data used was the oil and gas well files maintained by the NDGS. A computer library was created containing all the necessary oil and gas well data in the North Dakota Geological Survey oil and gas well files. Stratigraphic data, bottomhole temperature data, and chemical data are presented to map form to show the geothermal gradient, temperature, and depth of potential hydrothermal aquifers and the chemical characteristics of potential hydrothermal aquifers. DOE

N81-23569# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mining and Minerals Engineering.
DESIGN OPTIMIZATION IN UNDERGROUND COAL SYSTEMS. VOLUME 6: LHDSIM: A LOAD-HAUL-DUMP SIMULATOR FOR ROOM-AND-PILLAR MINING SYSTEMS Final Report
Feb. 1981 270 p refs
(Contracts DE-AC01-76ET-10722; EX-76-C-01-1231)
(FE-1231-24-Vol-6) Avail: NTIS HC A04/MF A01

The simulator is a combination deterministic and stochastic model, and test runs insure its operational capability. The potential application is primarily for equipment selection and evaluation in a load-haul-dump underground mining system with either conventional or continuous mining equipment. The computer program provides an excellent method of evaluating the use of load-haul-dump systems of varying capacity and may be used to compare the productive potential of this method with conventional loading/hauling devices and systems. DOE

N81-23570# Eaton Industries of Houston, Inc., Tex.
TESTING GEOPRESSURED GEOTHERMAL RESERVOIRS IN EXISTING WELLS Annual Report
1980 75 p
(Contract DE-AC08-80ET-27081)
(DOE/ET-27081/2) Avail: NTIS HC A04/MF A01

Wells of Opportunity are located by screening published information on oil industry activity and through personal contacts with oil operators. This process resulted in recommendation of 21 candidate wells to the DOE for the WOO program. Of the 21 wells recommended, 7 were accepted. Six of these 7 were acquired for testing. Three wells were tested, and preliminary test results are briefly described and are shown in a table. The actual testing schedule and the originally proposed matched very closely. Cumulative costs through November 1980 were approximately $6.5 million and compare to an estimate of $8.5 million for the same period. A graphical comparison of actual versus estimated costs is given. DOE

N81-23571# ICF, Inc., Washington, D. C.
COAL RESOURCE INFORMATION. VOLUME 1: COAL RESOURCE INFORMATION REQUIREMENTS Final Report
J. M. Eyster, D. E. Klein, and D. R. Walton Dec. 1980 99 p refs
(EPRI Proj. 868-1)
(EPRI-EA-673-Vol-1) Avail: NTIS HC A05/MF A01

Coal resource information is defined as data on in situ coal resources (e.g., seam thichness, hydrologic data, and depth of overburden) and the physical and chemical properties of coal (e.g., proximate analysis, sulfur composition, and grindability) which affect its mineability or usability. All data necessary for each of seven categories of production and use are included: extraction; beneficiation; transporting, loading and storage; carbonization; combustion; gasification; and liquefaction. The findings are the outcome of a 1977 survey of experts in all areas of coal production and use. DOE

N81-23572# ICF, Inc., Washington, D. C.
COAL RESOURCE INFORMATION, VOLUME 2. PART 1: REVIEW OF MAJOR RESOURCE STUDIES AND ONGOING RESEARCH Final Report
J. M. Eyster, D. E. Klein, and D. R. Walton Dec. 1980 145 p refs
(EPRI Proj. 868-1)
(EPRI-EA-673-Vol-2-Pt-1) Avail: NTIS HC A07/MF A01

Selected major research studies of U.S. coal resources are reviewed. Published and ongoing research reports are divided into general, national, regional, and coal quality categories. Information, statement of the intended purpose(s), and judgement as to how well that purpose was executed is summarized. Tables, maps, and other illustrations are provided. Listings of ongoing research projects are organized by state headings, with the additional heading of United States for studies whose geographic scope is larger than a single state. Each entry provides bibliographical information as to author, sponsoring organization, title, and

approximate dates of the project. A brief paragraph description of the substance of the project is presented. DOE

N81-23573# Argonne National Lab., Ill. Energy and Environmental Systems Div.

ILLINOIS BIOMASS RESOURCES. ANNUAL CROPS AND RESIDUES; CANNING AND FOOD-PROCESSING WASTES, PRELIMINARY ASSESSMENT

Antonios A. Antonopoulos Jun. 1980 118 p refs
(Contract W-31-109-eng-38)
(ANL/EMR-6) Avail: NTIS HC A06/MF A01

Crops, crop residues, and food-processing wastes in Illinois were studied as energy sources. The effects of their use on both agriculture and industry were appraised, biomass energy conversion systems were analyzed, and products that could be generated from biomass were environmentally and economically evaluated. Of the 39 x 10(6) tons of residues generated in 1978 in Illinois from seven main crops, about 85% is collectible. The thermal energy equivalent of this material is 658 x 10(6) Btu, or 0.66 quad. And by fermenting 10% of the corn grain, some 323 million gallons of ethanol could have been produced in 1978. Another 3 million gallons of ethanol could have been produced in the same year from wastes generated by the state's food-processing establishments. DOE

N81-23574# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mining and Minerals Engineering.

DESIGN OPTIMIZATION IN UNDERGROUND COAL SYSTEMS. VOLUME 9: MODIFIED FACESIM AND COST-SCHED PROGRAMS Final Technical Report

28 Feb. 1981 198 p
(Contracts DE-AC01-76ET-10722; EX-76-C-01-1231; E(49-18)-1231)
(FE-1231-27-Vol-9) Avail: NTIS HC A09/MF A01

The modified FACESIM and COST-SCHED computer programs include the following options: (1) a routine which simplifies the input data cards required by the original FACESIM program; (2) provisions to plot graphically the output of FACESIM program; (3) an integrated computer program, which includes the original and two later versions as options of the FACESIM suite of programs the Two Roofbolters and the Battery Haulage versions; and (4) an expansion of the COST-SCHED program to compute ash, BTU, sulfur and reject values as the coal is mined. The modified programs may be used in a variety of applications including evaluation of mining conditions and methods, designing section layouts, evaluating and designing new equipment, justifying capital expenditures, developing and maintaining production schedules and quality control standards. DOE

N81-23575# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mining and Minerals Engineering.

DESIGN OPTIMIZATION IN UNDERGROUND COAL SYSTEMS. VOLUME 3: STRUCTURAL CHARACTERIZATION OF COAL Final Technical Report

Feb. 1981 272 p refs
(Contracts DE-AC01-76ET-10722; EX-76-C-01-1231; E(49-18)-1231)
(FE-1231-21-Vol-3) Avail: NTIS HC A12/MF A01

An extensive number of specimens, representing 14 major coal seams in the nation, were tested and the following results were obtained: coal strength is dependent upon the loading rate, recommended range 50 to 150 psi/sec; results indicated a random distribution of uniaxial compressive strength regarding the moisture content; the elastic modulus appeared to be independent of the specimen size; given equivalent areas and W/H ratios, a difference existed between the strengths of cubical and cylindrical specimens; and when applied to the Holland-Gaddy pillar design equations, this strength difference can substantially alter pillar sizes and hence the extraction ratio. A procedure was developed for modifying the traditional pillar-design equation so that it may be used in conjunction with drill-core strength data. An example is presented to illustrate the application of this approach. Such a procedure may prove invaluable when developing new mining properties for which cubical coal samples are not available. DOE

N81-23576# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mining and Minerals Engineering.

DESIGN OPTIMIZATION IN UNDERGROUND COAL SYSTEMS. VOLUME 7: PREDICTION OF MINING SUBSIDENCE AND RELATED PARAMETERS OVER LONGWALL MINING OPERATIONS Final Technical Report

28 Feb. 1981 118 p refs
(Contracts DE-AC01-76ET-10722; EX-76-C-01-1231)
(FE-1231-25) Avail: NTIS HC A06/MF A01

A computerized method for the prediction of mining subsidence is developed. The mechanics of mining subsidence are reviewed. The prediction of subsidence by mathematical methods based on the theories of elasticity, viscoelasticity, viscoplasticity, and the use of influence functions is described. Subsidence prediction by the zone-area method and by the graphical method is described. The components of mining damage, with particular emphasis on structural damage to structures, are analyzed. A subsidence simulation program is presented. J.D.H.

N81-23577# Hawaii Univ., Honolulu. Water Resources Research Center.

UNDERGROUND RESIDENCE TIMES AND CHEMICAL QUALITY OF BASAL GROUNDWATER IN PEARL HARBOR AND HONOLULU AQUIFERS, OAHU, HAWAII Technical Report, 1 Sep. - 31 Dec. 1979

Theodorus H. Hufen, Paul Eyre, and William McConachie Feb. 1980 84 p refs
(Contract DI-14-31-0001-3811)
(PB81-135444; TR-129) Avail: NTIS HC A05/MF A01 CSCL 08H

The deterioration in chemical quality of basal water with underlying saline water is of concern on Oahu, where the Pearl Harbor and Honolulu groundwater systems constitute a primary source of fresh water. Isotope and chemical analyses were used to investigate the storage and flow of the system of six areas in southern Oahu. Potential origins of waters were determined by using mixing models and chemical compositions of water samples from sources located within a few miles of each other. Striking differences were found among the six areas. GRA

N81-23578# Wisconsin Univ. - Madison.

METHOD FOR ANALYSIS OF ORGANIC COMPOUNDS IN THE GREAT LAKES

Joseph J. Delfino, ed. 1980 272 p refs Presented at a Workshop held at Wisconsin Univ., Milwaukee, 1-2 Apr. 1980 Sponsored by NOAA
(PB81-149783; WIS-SG-80-236; NOAA-80111405)
Copyright. Avail: Issuing Activity CSCL 07D

Analytical approaches appropriate to the analysis of water, biota, sediment and atmospheric samples to organic compounds are discussed. It was attempted to establish, where possible, a consensus among the participants regarding the most useful and applicable analytical techniques to use in the Great Lakes. The discussions held at the workshop and certain options for those involved in Great Lakes analytical work are presented. GRA

N81-23579# Geological Survey, Lincoln, Nebr. Water Resources Div.

WATER RESOURCES DATA FOR ARKANSAS, WATER YEAR 1979 Annual Report, 1 Oct. 1978 - 30 Sep. 1979

Oct. 1980 647 p refs
(PB81-144842; USGS/WRD/HD-80/009; USGS-WDR-AR-79-1) Avail: NTIS HC A99/MF A01 CSCL 08H

Water resources data consist of records of stage, discharge, and water quality of streams and wells; stage, contents, and water quality of lakes and reservoirs. Discharge records for 66 gaging stations; stage only records for one gaging station; stage and contents for four lakes and reservoirs; water quality for 151 stations, 51 partial record flow stations, seven lakes, and five wells; and water levels for 83 observations wells are reported. Also included are 125 crest stage partial record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. GRA

N81-23580# Geological Survey, Anchorage, Alaska. Water Resources Div.

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1979 Annual Water Data Report, 1 Oct. 1978 - 30 Sep. 1979

Nov. 1980 375 p
(PB81-144818; USGS/WRD/HD-80/002; USDS-WDR-AK-79-1) Avail: NTIS HC A16/MF A01 CSCL 08H

Water resources data consists of records of stage, discharge, and water quality of streams; stage and water quality of lakes; and water levels and water quality in wells and springs. This report contains discharge records for 111 gaging stations; stage only records for 2 gaging stations; water quality for 58 stations; and water levels for 30 observation wells. Also included are 62 low flow, 89 crest stage, and 24 water quality partial record stations. GRA

N81-23581# Bureau of Mines, Tuscaloosa, Ala.
A CONTINUOUS DIELECTRIC SEPARATOR FOR MINERAL BENEFICIATION
C. E. Jordan, G. V. Sullivan, B. E. Davis, and C. P. Weaver 1980 24 p refs Prepared in cooperation with Alabama Univ., Tuscaloosa
(PB81-135014; BM-RI-8437) Avail: NTIS HC A02/MF A01 CSCL 08I

The separator consists of a rotating drum electrode and a wire screen electrode positioned 3 mm apart. A high voltage applied across the electrodes that are immersed in a dielectric fluid produces a high-gradient electric field. The high-dielectric constant (K) minerals are attracted to and conveyed through the separator by the rotating drum electrode, while the low K minerals settle through the screen electrode. Several design and operating parameters, such as electrode configurations, the dielectric liquid and its dielectric constant, electrical voltage and frequencies, feed rates, and particle sizes were studied. GRA

N81-23582# Bureau of Mines, Amarillo, Tex. Helium Field Operations.
HELIUM RESOURCES OF THE UNITED STATES, 1979
B. J. Moore 1980 33 p refs
(PB81-150146; BM-IC-8831) Avail: NTIS HC A03/MF A01 CSCL 08E

The helium resources are reported in four categories: (1) helium in measured natural gas reserves and in storage; (2) helium in indicated natural resources; (3) helium in hypothetical natural gas resources; and (4) helium in speculative natural gas resources. GRA

N81-23583# Indian Photo-Interpretation Inst., Dehra Dun. Indian Society of Photo-Interpretation and Remote Sensing.
SEMINAR ON APPLICATION OF AERIAL PHOTO-INTERPRETATION AND REMOTE SENSING TECHNIQUES FOR NATURAL RESOURCES SURVEY AND ENVIRONMENTAL ANALYSIS, ABSTRACTS
1980 112 p Seminar held at Dehra Dun, India, 8-10 Oct. 1980
(PB81-145153) Avail: NTIS HC A06/MF A01 CSCL 08E

Topic areas cover: Geology, Geotechnics, Geomorphology, Hydrogeology, Soil conservation and watershed management, Land use and agriculture, and Forest resources inventory. Instrumentation and methodology are also covered. GRA

N81-23584# Missouri Water Resources Center, Rolla.
PENETRATION OF SOLAR RADIATION IN SNOW-ICE COVERED WATER RESERVOIRS: WINTERKILL Completion Report, Oct. 1978 - Sep. 1980
Alfred L. Crosbie and Gary W. Davidson 28 Nov. 1980 118 p refs
(Contracts DI-14-34-0001-9027; DI-14-34-0001-0127)
(PB81-149643; W81-00979; OWRT-A-113-MO(1)) Avail: NTIS HC A06/MF A01 CSCL 06C

A snow-ice covered water reservoir is modeled by two absorbing-scattering planar layers. The scattering centers in the snow layer are assumed to be ice spheres, while the scattering centers in the ice layer are assumed to be spherical voids. The scattering characteristics of each layer are predicted by Mie theory. A Dirac-delta function approximation to the scattering phase function is introduced to simplify the analysis and account for strong forward scattering due to diffraction. An invariant imbedding solution technique is then used to solve the transport equation including multiple scattering for the penetration of solar radiation through the snow-ice layer. GRA

N81-23585# Clemson Univ., S.C. Water Resources Research Inst.
FIVE-YEAR WATER RESOURCES RESEARCH AND DEVELOPMENT GOALS, OBJECTIVES AND PRIORITIES FOR SOUTH CAROLINA, 1982-1987
P. B. Zielinski and J. Vorgettes Aug. 1980 113 p refs
(PB81-134918; WRRI-91; W81-00986) Avail: NTIS HC A06/MF A01 CSCL 13B

The five-year water resources research plan for South Carolina presented background meteorological, hydrological, and geological information, a description of past/current studies, and identified water problems. Water quality problems identified included ground/surface water pollution source identification, coastal zone groundwater pollution, waste discharges in surface waters, improved treatment performance needs for waste stabilization ponds, reduction of siltation and high nutrient levels in order to reverse lake eutrophication, and monitoring and safe disposal of toxic waste. Author

N81-23586# Arkansas Univ., Fayetteville. Arkansas Water Resources Center.
EFFECTS OF CHANGES IN SURFACE WATER REGIME AND/OR LAND USE ON THE VERTICAL DISTRIBUTION OF WATER AVAILABLE FOR WETLAND VEGETATION. PART 1: DYNAMIC MODEL OF THE ZONE OF AERATION
Robert N. MacCallum and R. A. Sims Jun. 1980 71 p refs (OWRT Proj. A-023-ARK(3))
(PB81-145047; PUB-70; W81-00968; OWRT-A-023-ARK(3)) Avail: NTIS HC A04/MF A01 CSCL 08H

A dynamic mathematical model of the zone of aeration for wetlands was developed which describes the vertical distribution of water available for use by vegetation. A mathematical model for simulating one dimensional vertical groundwater movement in unsaturated soils of the Kansas prairie region was adapted for use in a wetlands environment, typified by the eastern Arkansas wetlands forest. The adapted model consisted of two second order nonlinear partial differential equations, and an algorithm for their numerical solution. The original model was extended to include functions for seasonal changes in transpiration and for drainage of excess precipitation. The model provides a management tool to assist prediction of the environmental impact of proposed flood control projects. GRA

N81-23587# Bureau of Mines, Amarillo, Tex. Helium Operations.
HELIUM: ITS RELATIONSHIP TO GEOLOGIC SYSTEMS AND ITS OCCURRENCE WITH THE NATURAL GASES, NITROGEN, CARBON DIOXIDE AND ARGON
Claude A. Tongish 1980 185 p refs
(PB81-151995; BM-RI-8444) Avail: NTIS HC A09/MF A01 CSCL 08G

Information on the accumulation and distribution of helium in U.S. natural gas reservoirs is presented. The investigation concerns the relationship or association of helium with geographic location, geologic age, reservoir depth, nitrogen, carbon dioxide, and argon. The report is based on gas analysis information collected by the Bureau from 1917 to 1974 from 10,086 gas samples, representing 6,455 reservoirs in 35 states. Results of the various correlations are presented in tables and charts. Relationships have also been determined quantitatively by measures of correlation. These data can be used with other information for predicting the future helium resources of the United States. GRA

N81-23588# Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
DEVELOPMENT OF A MODEL FOR ESTIMATING THE EXTENT OF RIVER FLOODING WITH SATELLITE AND IN SITU DATA
W. R. Philipson, J. N. McLeester, and W. R. Hafker Nov. 1980 29 p refs
(Contract DI-14-34-0001-0134)
(PB81-152035; W81-01203; OWRT-A-089-NY(1)) Avail: NTIS HC A03/MF A01 CSCL 08H

The value and use of LANDSAT satellite data for obtaining information on flooding of the Black River Basin in northern New York are assessed. The reliability of delineating flood-affected areas from LANDSAT data was established by comparison with flood boundaries derived from aerial photographs of a different but similar flood. It was established that the delineation of flood affected areas could be performed through visual analysis of band 7 (near-infrared) LANDSAT images as reliably as it could through color additive viewing or digital analysis using all LANDSAT bands or scenes of different dates (flooding and no flooding). A preliminary perdictive model was developed which uses in situ measurements of river discharge to delineate the extent of flooding. GRA

N81-23589# General Accounting Office, Washington, D. C. Community and Economic Development Div.
GROUND WATER OVERDRAFTING MUST BE CONTROLLED
12 Sep. 1980 62 p
(PB81-156135; CED-80-96) Avail: NTIS HC A04/MF A01 CSCL 08H

The numerous problems associated with ground water overdrafting in many areas of the Nation and the need for the Federal Government to discourage continued uncontrolled overdrafting are discussed. It is recommended that Congress direct the Department of Agriculture, the Army, and the Interior to require that affected States and communities implement or have plans to implement a program for controlling ground water pumping and a conservation program before the start of federally funded water resources or ground water mitigation projects. GRA

N81-23590# Bureau of Mines, Pittsburgh, Pa.
REVIEW OF HORIZONTAL DRILLING TECHNOLOGY FOR METHANE DRAINAGE FROM U.S. COALBEDS
Gerald L. Finfinger and Joseph Cervik 1980 26 p refs
(PB81-148181; BM-RI-IC-8829) Avail: NTIS HC A03/MF A01 CSCL 08I

Underground methane drainage programs being conducted in various coalbeds are reviewed. Equipment used in drainage programs such as drills, underground pipelines, and methane monitoring systems is described. GRA

N81-23591# Bureau of Mines, Spokane, Wash.
SHAFT DESIGN IN THE COEUR D'ALENE MINING DISTRICT, IDAHO: RESULTS OF IN SITU STRESS AND PHYSICAL PROPERTY MEASUREMENTS
Michael J. Beus and Samuel S. M. Chan 1980 46 p refs
(PB81-148199; BM-RI-8435) Avail: NTIS HC A03/MF A01 CSCL 08I

Data from field investigations conducted to obtain data on rock stress and physical properties were used as input to detailed finite-element analyses in order to establish structural design criteria for deep-vein mine shafts. The stress data were reduced by least squares linear regression techniques to enable prediction of vertical and horizontal stresses to 7,500 feet. Ratios between the horizontal stresses as utilized for shaft design varied considerably, and a hydrostatic condition is the exception, based on Bureau measurements. Physical properties also varied widely, due to the complex geologic structure. Analyses of the data in terms of the tectonic history of the area show reasonable correlation. GRA

N81-23592# Bureau of Mines, Pittsburgh, Pa.
GUIDE TO SUBSTATION GROUNDING AND BONDING FOR MINE POWER SYSTEMS
Wils L. Cooley and Roger L. King 1980 34 p refs
(PB81-148264; BM-RI-IC-8835) Avail: NTIS HC A03/MF A01 CSCL 08I

Specific engineering information is provided for the mining industry. Using as little theory as possible, the guide lines are general enough to cover most substations, but specific enough to provide direct help with each substation. Practice is recommended that is in agreement with present Federal rules and regulations. GRA

N81-23593# Bureau of Mines, Twin Cities, Minn. Twin Cities Research Center.
STRUCTURE RESPONSE AND DAMAGE PRODUCED BY AIRBLAST FORM SURFACE MINING
David E. Siskind, Virgil J. Stachura, Mark S. Stagg, and John W. Kopp 1980 121 p refs
(PB81-148918; BM-RI-8485) Avail: NTIS HC A06/MF A01 CSCL 08I

Airblast from surface mining was studied to assess its damage and annoyance potential and to determine safe levels and appropriate measurement techniques. Research results obtained from direct measurements of airblast produced structure responses, damage and analysis of instrument characteristics are combined with studies of sonic booms and human responses to transient overpressures. Of four methods, only the 0.1 Hz high-pass linear method accuracy measures the total airblast energy present. Where a single airblast measuring system must be used, the 2 Hz linear peak response is the best overall compromise. The human response and annoyance problem from airblast is caused primarily by secondary noises. Although these will not entirely be precluded by the recommended levels, they are low enough to preclude damage to residential structures and any possible human injury over the long term. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N81-23594*# Argonne National Lab., Ill. Energy and Environmental Systems Div.
HEALTH AND SAFETY: PRELIMINARY COMPARATIVE ASSESSMENT OF THE SATELLITE POWER SYSTEM (SPS) AND OTHER ENERGY ALTERNATIVES
L. J. Habegger, J. R. Gasper, and C. Brown Apr. 1980 134 p refs Sponsored in cooperation with NASA
(Contract W-31-109-eng-38)
(NASA-CR-164215; DOE/ER-0053) Avail: NTIS HC A07/MF A01 CSCL 10A

Data readily available from the literature were used to make an initial comparison of the health and safety risks of a fission power system with fuel reprocessing; a combined-cycle coal power system with a low-Btu gasifier and open-cycle gas turbine; a central-station, terrestrial, solar photovoltaic power system; the satellite power system; and a first-generation fusion system. The assessment approach consists of the identification of health and safety issues in each phase of the energy cycle from raw material extraction through electrical generation, waste disposal, and system deactivation; quantitative or qualitative evaluation of impact severity; and the rating of each issue with regard to known or potential impact level and level of uncertainty. T.M.

N81-23595*# Rockwell International Corp., Downey, Calif. Space Operations and Satellite Systems Div.
SATELLITE POWER SYSTEMS (SPS) CONCEPT DEFINITION STUDY (EXHIBIT D). VOLUME 7: SYSTEM/SUBSYSTEMS REQUIREMENTS DATABOOK Final Report
G. M. Hanley Washington NASA Mar. 1981 267 p
(Contract NAS8-32475)
(NASA-CR-3399; M-340-Vol-7; SSD-80-0108-7-Vol-7) Avail: NTIS HC A12/MF A01 CSCL 10B

This volume summarizes the basic requirements used as a guide to systems analysis, and is a basis for the selection of candidate Satellite Power Systems (SPS) point designs. Initially, these collected data reflected the level of definition resulting from the evaluation of a broad spectrum of SPS concepts. As the various concepts matured, these requirements were updated to reflect the requirements identified for the projected satellite system/subsystem point designs. Included is an updated version of earlier Rockwell concepts using klystrons as the specific

microwave power amplification approach, as well as a more in-depth definition, analysis and preliminary point design on two concepts based on the use of advanced solid state technology to accomplish the task of high power amplification of the 2.45 GHz transmitted power beam to the Earth receiver. Finally, a preliminary definition of a concept using magnetrons as the microwave power amplifiers is presented. S.F.

N81-23596# Dartmouth Coll., Hanover, N.H. School of Engineering.
ADVANCED SYSTEM DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE, EXECUTIVE SUMMARY
Marion McCollom, ed., Thomas Adler, Karen Altman, Mollie Beatie, Lauren Brown, Jane Difley, William T. Glidden, Jr., Andrew Heller, Elizabeth Hicks, Susan Knight et al Sep. 1980 49 p Prepared for Rust Engineering Co. 8 Vol.
(DOE/ET-20055/T3-Exec-Summ; RP-291) Avail: NTIS HC A03/MF A01

Impacts on the natural and human environment expected to result from the construction, operation, and fueling of proposed wood-fuel power plants in Maine are summarized. The environmental impacts of alternative supplementary fuels are discussed. DOE

N81-23597*# RKL Controls Co., Lumberton, N.J.
SOLAR HEATING AND COOLING SYSTEM INSTALLED AT RKL CONTROLS COMPANY, LUMBERTON, NEW JERSEY Final Report
Mar. 1981 258 p Sponsored in cooperation with NASA
(Contract EX-76-C-01-2397)
(NASA-CR-161679) Avail: NTIS HC A12/MF A01 CSCL 10A

The final results of the design and operation of a computer controlled solar heated and cooled 40,000 square foot manufacturing building, sales office, and computer control center/display room are summarized. The system description, test data, major problems and resolutions, performance, operation and maintenance manual, equipment manufacturers' literature, and as-built drawings are presented. The solar system is composed of 6,000 square feet of flat plate collectors, external above ground storage subsystem, controls, absorption chiller, heat recovery, and a cooling tower. J.D.H.

N81-23598*# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Energy Systems Div.
MOD-OA 200 KW WIND TURBINE GENERATOR ENGINEERINGING Final Engineering Drawing Report
T. S. Andersen, C. A. Bodenschatz, A. G. Eggers, P. S. Hughes, and R. F. Lampe Aug. 1980 246 p
(Contract DEN3-163)
(NASA-CR-165129; DOE/NASA/0163-3; AESD-TME-3053) Avail: NTIS HC A11/MF A01 CSCL 10B

Engineering drawings and the detailed mechanical and electrical design of a horizontal-axis wind turbine designed for DOE at the NASA Lewis Research Center and installed in Clayton, New Mexico are discussed. The drawings show the hub, pitch change mechanism, drive train, nacelle equipment, yaw drive system, tower, foundation, electrical power systems, and the control and safety systems. A.R.H.

N81-23599*# Rockwell International Corp., Canoga Park, Calif.
SATELLITE POWER SYSTEMS (SPS) CONCEPT DEFINITION STUDY, EXHIBIT F Final Report
G. M. Hanley 28 Apr. 1981 157 p
(Contract NAS8-32475)
(NASA-CR-161750; SSD-81-0059) Avail: NTIS HC A08/MF A01 CSCL 10B

Preliminary technical data were derived for three new system satellite concepts. The concepts are: a geo-solar array and antenna with free-flying geo-solar reflector; a geo-solar array and antenna with free-flying geo-radio-frequency reflector; and a sun-synchronous solar array and antenna with free-flying geo-radio-frequency reflector. Parametric data are provided on microwave sidelobe reduction as a function of design changes. T.M.

N81-23600*# Energy Research Corp., Danbury, Conn.
EVALUATION OF DISTRIBUTED GAS COOLING OF PRESSURIZED PAFC FOR UTILITY POWER GENERATION Quarterly Report, Dec. 1980 - Feb. 1981
M. Farooque, M. Hooper, and H. Maru Mar. 1981 19 p
(Contract DEN3-201; Contract DE-AI03-80ET-17088)
(NASA-CR-165303; DOE/NASA/0201/2) Avail: NTIS HC A02/MF A01 CSCL 10B

A proof-of-concept test for a gas-cooled pressurized phosphoric acid fuel cell is described. After initial feasibility studies in short stacks, two 10 kW stacks are tested. Progress includes: (1) completion of design of the test stations with a recirculating gas cooling loop; (2) atmospheric testing of the baseline stack. S.F.

N81-23601*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHOTOVOLTAICS PROGRAM UTILITY INTERFACE SOUTHWEST REGIONAL WORKSHOP PROCEEDINGS
I. S. Bengelsdorf 1 Apr. 1981 53 p Proceedings of Workshop held in Pasadena, Calif., 9-10 Sep. 1980
(Contracts NAS7-100; DE-AI01-76ET-20356; JPL Proj. 5220-10)
(NASA-CR-164284; JPL-Pub-81-32; DOE/ET-20356/2) Avail: NTIS HC A04/MF A01 CSCL 10A

The needs and constraints of the utilities are summarized. The capabilities and limitations of photovoltaic systems as an alternative electricity generation option by utilities are discussed. T.M.

N81-23602*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ELECTRIC AND HYBRID VEHICLES CHARGE EFFICIENCY TESTS OF ESB EV-106 LEAD ACID BATTERIES
John J. Rowlette 15 Jan. 1981 154 p
(Contracts NAS7-100; DE-AI01-78CS-54209; JPL Proj. 5030-462)
(NASA-CR-164283; JPL-Pub-80-94; DOE/CS-54209/1) Avail: NTIS HC A08/MF A01 CSCL 10C

Charge efficiencies were determined by measurements made under widely differing conditions of temperature, charge procedure, and battery age. The measurements were used to optimize charge procedures and to evaluate the concept of a modified, coulometric state of charge indicator. Charge efficiency determinations were made by measuring gassing rates and oxygen fractions. A novel, positive displacement gas flow meter which proved to be both simple and highly accurate is described and illustrated. T.M.

N81-23603*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
POTENTIAL IMPACTS OF BRAYTON AND STIRLING CYCLE ENGINES
R. C. Heft 15 Nov. 1980 151 p refs
(Contracts NAS7-100; DE-AI01-76CS-51011)
(NASA-CR-164278; JPL-Pub-81-22) Avail: NTIS HC A08/MF A01 CSCL 10B

Two engine technologies (Brayton cycle and Stirling cycle) are examined for their potential economic impact and fuel utilization. An economic analysis of the expected response of buyers to the attributes of the alternative engines was performed. Hedonic coefficients for vehicle fuel efficiency, performance and size were estimated for domestic cars based upon historical data. The marketplace value of the fuel efficiency enhancement provided by Brayton or Stirling engines was estimated. Under the assumptions of 10 years for plant conversions and 1990 and 1995 as the introduction data for turbine and Stirling engines respectively, the comparative fuel savings and present value of the future savings in fuel costs were estimated. J.D.H.

N81-23604*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEVELOPMENT AND TESTING OF THERMAL ENERGY STORAGE MODULES FOR USE IN ACTIVE SOLAR HEATING AND COOLING SYSTEMS Final Report
John C. Parker Apr. 1981 34 p Prepared in cooperation with Artech Corp., Falls Church, Va. Prepared for DOE, Washington, D.C.
(Contract NAS8-32254)
(NASA-TM-82415) Avail: NTIS HC A03/MF A01 CSCL 10A

The project development requirements and criteria are presented along with technical data for the modules. Performance tests included: ducting, temperature, pressure and air flow measurements, dry and wet bulb temperature; duct pressure measurements; and air conditioning apparatus checks; installation, operation, and maintenance instructions are included. T.M.

N81-23605*# International Business Machines Corp., Huntsville, Ala. Federal Systems Div.
SOLAR ENERGY SYSTEM ECONOMIC EVALUATION FOR WORMSER COLUMBIA, SOUTH CAROLINA Final Report
Sep. 1980 102 p refs
(Contract NAS8-32036)
(NASA-CR-161722) Avail: NTIS HC A06/MF A01 CSCL 10A

The Solar Energy System is not economically beneficial under the assumed economic conditions at the sites considered. Economic benefits from this system depend on decreasing the initial investment and the continued increase in the cost of conventional energy. Decreasing the cost depends on favorable tax treatment and continuing development of solar energy technology. Fuel cost would have to increase drastically while the cost of the system would have to remain constant or decrease for the system to become economically feasible. L.F.M.

N81-23606*# Ferebee, Walters and Associates, Charlotte, N.C.
SOLAR HEATING AND HOT WATER SYSTEM INSTALLED AT CHARLOTTE MEMORIAL HOSPITAL, CHARLOTTE, NORTH CAROLINA Final Report
May 1981 67 p refs Sponsored by NASA
(Contract EX-76-C-01-2394)
(NASA-CR-161731) Avail: NTIS HC A04/MF A01 CSCL 10A

Detailed information regarding the design and installation of a heating and hot water system in a commercial application is given. This information includes descriptions of system and building, design philosophy, control logic operation modes, design and installation drawing and a brief description of problems encountered and their solutions. Author

N81-23607*# International Business Machines Corp., Huntsville, Ala. Federal Systems Div.
SOLAR ENERGY SYSTEM ECONOMIC EVALUATION FOR COLT PUEBLO, PUEBLO, COLORADO Final Report
Sep. 1980 108 p refs
(Contract NAS8-32036)
(NASA-CR-161725) Avail: NTIS HC A06/MF A01 CSCL 10A

The Solar Energy System is not economically beneficial under the assumed economic conditions at Pueblo, Colorado; Yosemite, California; Albuquerque, New Mexico; Fort Worth, Texas; and Washington, D.C. Economic benefits from this system depend on decreasing the initial investment and the continued increase in the cost of conventional energy. Decreasing the cost depends on favorable tax treatment and continuing development of solar energy technology. Fuel cost would have to increase drastically while the cost of the system would have to remain constant or decrease for the system to become economically feasible. L.F.M.

N81-23608*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RESPONSE OF NICKEL TO ZINC CELLS TO ELECTRIC VEHICLE CHOPPER DISCHARGE WAVEFORMS
Robert L. Cataldo 1981 10 p refs Presented at the Elec. Vehicle Council Symp. 6, Baltimore, 21-23 May 1981; sponsored by the Elec. Vehicle Council
(Contract DE-AI01-77CS-51044)
(NASA-TM-81713; DOE/NASA/51044-16; E-746) Avail: NTIS HC A02/MF A01 CSCL 10C

The preliminary results of simulated electric vehicle chopper controlled discharge of a Nickel/Zinc battery shows delivered energy increases of 5 to 25 percent compared to constant current discharges of the same average current. The percentage increase was a function of chopper frequency, the ratio of peak to average current, and the magnitude of the discharge current. Because the chopper effects are of a complex nature, electric vehicle battery/speed controller interaction must be carefully considered in vehicle design to optimize battery performance. Author

N81-23609*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL EVALUATION OF CATALYTIC COMBUSTION WITH HEAT REMOVAL AT NEAR STOICHIOMETRIC CONDITIONS
Daniel L. Bulzan 1980 16 p refs Presented at the 4th Workshop on Catalytic Combust., Cincinnati, 14-15 May 1980
(Contract DE-AI01-77CS-51040)
(NASA-TM-81748; DOE/NASA/51040-23; E-814) Avail: NTIS HC A02/MF A01 CSCL 10A

Two concentric tube configurations were tested. Tests were conducted at an inlet pressure of 150,000 Pa, inlet fuel air mixture temperatures from 780 to 960 K, combustion air flow rates from 0.78 to 1.5 g/s, equivalence ratios up to 0.90, and a range of cooling air flow rates. Propane and propylene fuels were used. Both configurations used air flowing through the center tube for cooling and combustion in the annulus on the catalytic surface. One configuration had the catalyst applied to the outside surface of the inner tube. Conversion of the fuel was very low for this configuration. The other configuration had the catalyst applied to the inside surface of the outer tube. Conversion of the fuel was considerably better in this configuration. T.M.

N81-23610*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PRELIMINARY INVESTIGATION OF ACOUSTIC OSCILLATIONS IN AN H2-O2 FIRED HALL GENERATOR
Bert Phillips 1981 13 p refs Presented at the 19th Symp. on the Eng. Aspects of Magnetohydrodyn., Tullahoma, Tenn., 15-17 Jun. 1981
(Contract DE-AI01-77ET-10769)
(NASA-TM-81756; DOE/NASA/10769-15; E-819) Avail: NTIS HC A02/MF A01 CSCL 10A

Burner pressure oscillations and interelectrode voltage oscillations measured in an open-cycle supersonic flow Hall generator are presented. The ionized gas for the channel was supplied by seeding the approximately 1 lb/sec of hydrogen-oxygen combustion products with cesium. Since both the burner and the channel were located within magnetic fields exceeding 4 Tesla during operation, an infinite probe pressure measurement technique was used to measure burner pressure oscillations. Calibration of the burner pressure transducer using a resonance tube technique is presented. Evidence is presented for the existence of the first longitudinal mode of oscillations (5000 Hz) within the burner. Interelectrode voltage oscillations were simultaneously measured at two separate axial stations. The magnitude change and the phase shift between the two signals was interpreted as a decaying magnetoacoustic wave driven by the burner that propagates at local gas plus sonic velocities. The amplitude of the electrical voltage oscillations at the start of the power producing region of the channel varied with the magnetic field. This variation is compared with the results of a simple perturbation analysis. Arguments are presented for using an unsteady model for analyzing wave processes in channels. Author

N81-23611*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ASSESSMENT OF DISK MHD GENERATORS FOR A BASE LOAD POWERPLANT
Donald L. Chubb, F. D. Retallick (Westinghouse Electric Corp., Pittsburgh), C. L. Lu (Westinghouse Electric Corp., Pittsburgh), M. Stella (Westinghouse Electric Corp., Pittsburgh), J. D. Teare (MIT), W. J. Loubsky (MIT), J. F. Louis (MIT), and B. Misra (MIT) 1981 17 p refs Presented at the 19th Symp. on Engr. Aspects of Magnetohydrodyn., Tullahoma, Tenn., 15-17 Jun. 1981
(Contract DE-AI01-77ET-10769)
(NASA-TM-82609; DOE/NASA/10769-17; E-849) Avail: NTIS HC A02/MF A01 CSCL 10A

Results from a study of the disk MHD generator are presented. Both open and closed cycle disk systems were investigated. Costing of the open cycle disk components (nozzle, channel, diffuser, radiant boiler, magnet and power management) was

done. However, no detailed costing was done for the closed cycle systems. Preliminary plant design for the open cycle systems was also completed. Based on the system study results, an economic assessment of the open cycle systems is presented. Costs of the open cycle disk conponents are less than comparable linear generator components. Also, costs of electricity for the open cycle disk systems are competitive with comparable linear systems. Advantages of the disk design simplicity are considered. Improvements in the channel availability or a reduction in the channel lifetime requirement are possible as a result of the disk design. Author

N81-23612*# Motorola, Inc., Phoenix, Ariz. Semiconductor Group.

ANTI-REFLECTION COATINGS APPLIED BY ACID LEACHING PROCESS Final Report

E. Pastirik Sep. 1980 49 p refs Sponsored in part by DOE Prepared for JPL

(Contract JPL-955387)

(NASA-CR-164322; DOE/JPL-955387-80/3; JPL-9950-526) Avail: NTIS HC A03/MF A01 CSCL 10A

The Magicote C process developed by S.M. Thompsen was evaluated for use in applying an antireflective coating to the cover plates of solar panels. The process uses a fluosilicic acid solution supersaturated with silica at elevated temperature to selectively attack the surface of soda-lime glass cover plates and alter the physical and chemical composition of a thin layer of glass. The altered glass layer constitutes an antireflective coating. The process produces coatings of excellent optical quality which possess outstanding resistance to soiling and staining. The coatings produced are not resistant to mechanical abrasion and are attacked to some extent by glass cleansers. Control of the filming process was found to be difficult. Author

N81-23613*# Westinghouse Research and Development Center, Pittsburgh, Pa.

SILICON MATERIALS TASK OF THE LOW-COST SOLAR ARRAY PROJECT. PHASE 4: EFFECTS OF IMPURITIES AND PROCESSING ON SILICON SOLAR CELLS Quarterly Report, Oct. - Dec. 1980

R. H. Hopkins, M. H. Hanes, J. R. Davis, A. Rohatgi, P. Raichoudhury, and H. C. Mollenkopf (Hemlock Semiconductor Corp.) 30 Jan. 1981 69 p refs Sponsored in part by DOE Prepared for JPL

(Contract JPL-954331)

(NASA-CR-164331; DOE/JPL-954331-81/13; JPL-9950-530; QR-21) Avail: NTIS CSCL 10A

The results of the study form a basis for silicon producers, wafer manufacturers, and cell fabricators to develop appropriate cost-benefit relationships for the use of less pure, less costly solar grade silicon. Cr is highly mobile in silicon even at temperatures as low as 600 C. Contrasting with earlier data for Mo, Ti, and V, Cr concentrations vary from place to place in polycrystalline silicon wafers and the electrically-active Cr concentration in the polysilicon is more than an order of magnitude smaller than would be projected from single crystal impurity data. We hypothesize that Cr diffuses during ingot cooldown after growth, preferentially segregates to grain and becomes electrically deactivated. Accelerated aging data from Ni-contaminated silicon imply that no significant impurity-induced cell performance reduction should be expected over a twenty year device lifetime. T.M.

N81-23614*# Sanders Associates, Inc., Nashua, N. H.

HIGH TEMPERATURE SOLAR RECEIVER Final Report, 7 Jun. 1979 - 7 Apr. 1981

7 Apr. 1981 37 p

(Contract JPL-955454)

(NASA-CR-164332; JPL-9950-529) Avail: NTIS HC A03/MF A01 CSCL 10A

The development of a high temperature solar thermal receiver is described. A prototype receiver and associated test support (auxiliary) hardware was fabricated. Shakedown and initial performance tests of the prototype receiver were performed. Maximum outlet temperatures of 1600 F were achieved at 100% solar (70-75 kW) input power with 900 F inlet temperatures and a subsequent testing was concluded by a 2550 F outlet run. The window retaining assembly was modified to improve its tolerance for thermal distortion of the flanges. It is shown that cost effective receiver designs can be implemented within the framework of present materials technology. E.A.K.

N81-23615*# Motorola, Inc., Phoenix, Ariz. Semiconductor Group.

THE ESTABLISHMENT OF A PRODUCTION-READY MANUFACTURING PROCESS UTILIZING THIN SILICON SUBSTRATES FOR SOLAR CELLS Final Report

R. A. Pryor Oct. 1980 217 p Sponsored in part by DOE Prepared for JPL

(Contract JPL-955328; JPL Proj. 2364; et al)

(NASA-CR-164327; DOE/JPL-955328-80/4; JPL-9950-528; DRL-99; DRD-SE-5; Motorola-2364/4) Avail: NTIS HC A10/MF A01 CSCL 10A

Three inch diameter Czochralski silicon substrates sliced directly to 5 mil, 8 mil, and 27 mil thicknesses with wire saw techniques were procured. Processing sequences incorporating either diffusion or ion implantation technologies were employed to produce n+p or n+pp+ solar cell structures. These cells were evaluated for performance, ease of fabrication, and cost effectiveness. It was determined that the use of 7 mil or even 4 mil wafers would provide near term cost reductions for solar cell manufacturers. Author

N81-23616*# Solarex Corp., Rockville, Md.

A MODULE EXPERIMENTAL PROCESS SYSTEM DEVELOPMENT UNIT (MEPSDU) Quarterly Report, 26 Nov. 1980 - 28 Feb. 1981

1981 117 p refs Sponsored in part by DOE Prepared for JPL

(Contract JPL-955902)

(NASA-CR-164325; DOE/JPL-955902-81/1; JPL-9950-527; DRL-156; DRD-SE-3) Avail: NTIS HC A06/MF A01 CSCL 10A

The technical readiness of a cost effective process sequence that has the potential for the production of flat plate photovoltaic modules which met the price goal in 1986 of $.70 or less per Watt peak was demonstrated. The proposed process sequence was reviewed and laboratory verification experiments were conducted. The preliminary process includes the following features: semicrystalline silicon (10 cm by 10 cm) as the silicon input material; spray on dopant diffusion source; Al paste BSF formation; spray on AR coating; electroless Ni plate solder dip metallization; laser scribe edges; K & S tabbing and stringing machine; and laminated EVA modules. J.M.S.

N81-23617*# Science Applications, Inc., McLean, Va.

COST EFFECTIVE FLAT PLATE PHOTOVOLTAIC MODULES USING LIGHT TRAPPING Final Report

C. N. Bain, B. A. Gordon, T. M. Knasel, and R. L. Malinowski Apr. 1981 242 p refs Sponsored by NASA Prepared for JPL

(Contract JPL-955787)

(NASA-CR-164320; DOE/JPL-955677-81/1; JPL-9950-538; SAI-82-451-WA) Avail: NTIS HC A11/MF A01 CSCL 10A

Work in optical trapping in 'thick films' is described to form a design guide for photovoltaic engineers. A thick optical film can trap light by diffusive reflection and total internal reflection. Light can be propagated reasonably long distances compared with layer thicknesses by this technique. This makes it possible to conduct light from inter-cell and intra-cell areas now not used in photovoltaic modules onto active cell areas. T.M.

N81-23618*# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.

DEFECT STRUCTURE OF EFG SILICON RIBBON

H. Strunk (Max-Planck-Institut fuer Metallforschung), B. Cunningham, and D. Ast Dec. 1980 26 p refs Sponsored in part by DOE Prepared for JPL

(Contract JPL-954852)

(NASA-CR-164324; JPL-9950-540) Avail: NTIS HC A03/MF A01 CSCL 10A

The defect structure of EFG ribbons was studied using EBIC, TEM and HVEM. By imaging the same areas in EBIC and HVEM, a direct correlation between the crystallographic nature of defects and their electrical properties was obtained. (1) Partial dislocations at coherent twin boundaries may or may not be electrically active.

Since no microprecipitates were observed at these dislocations it is likely that the different electrical activity is a consequence of the different dislocation core structures. (2) 2nd order twin joins were observed which followed the same direction as the coherent first order twins normally associated with EFG ribbons. These 2nd order twin joins are in all cases strongly electrically active. EFG ribbons contain high concentrations of carbon. Since no evidence of precipitation was found with TEM it is suggested that the carbon may be incorporated into the higher order twin boundaries now known to exist in EFG ribbons.
Author

N81-23619*# Rockwell International Science Center, Thousand Oaks, Calif.
STUDY PROGRAM FOR ENCAPSULATION MATERIALS INTERFACE FOR LOW-COST SOLAR ARRAY Annual Report, 1 Jan. - 31 Dec. 1980
D. H. Kaelble, F. B. Mansfeld, M. Kendig, and C. Leung Feb. 1981 81 p refs Sponsored in part by DOE Prepared for JPL
(Contract JPL-954739)
(NASA-CR-164328; DOE/JPL-954739-4; JPL-9950-535; SC5106.104AR) Avail: NTIS HC A05/MF A01 CSCL 10A

The service integrity of the bonded interface in solar cell modules used in solar arrays is addressed. The development of AC impedance as a nondestructive evaluation (NDE) methodology for solar arrays is reported along with development of corrosion models and materials selection criteria for corrosion resistant interfaces.
J.M.S.

N81-23620*# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Energy Systems Div.
DESIGN, FABRICATION, AND BENCH TESTING OF A SOLAR CHEMICAL RECEIVER Final Report
William A. Summers and Joseph F. Pierre Jan. 1981 97 p refs
(Contracts NAS7-100; JPL-955639)
(NASA-CR-164333; JPL-9950-537; AESD-TME-3103) Avail: NTIS HC A05/MF A01 CSCL 10A

Solar thermal energy can be effectively collected, transported, stored, and utilized by means of a chemical storage and transport system employing the reversible SO2 oxidation reaction. A solar chemical receiver for SO3 thermal decomposition to SO2 and oxygen was analyzed. Bench tests of a ten foot section of a receiver module were conducted with dissociated sulfuric acid (SO3 and H2O) in an electrical furnace. Measured percent conversion of SO3 was 85% of the equilibrium value. Methods were developed to fabricate and assemble a complete receiver module. These methods included applying an aluminide coating to certain exposed surfaces, assembling concentric tubes with a wire spacer, applying a platinum catalyst to the tubing wall, and coiling the entire assembly into the desired configuration.
T.M.

N81-23621*# MB Associates, San Ramon, Calif.
PROCESS DEVELOPMENT FOR AUTOMATED SOLAR CELL AND MODULE PRODUCTION. TASK 4: AUTOMATED ARRAY ASSEMBLY
John J. Hagerty 15 Apr. 1981 33 p Sponsored in part by DOE Prepared for JPL
(Contract JPL-955699)
(NASA-CR-164323; QR-3; DOE/JPL-955699-81/03; JPL-9950-533) Avail: NTIS HC A03/MF A01 CSCL 10A

The Automated Lamination Station is mechanically complete and is currently undergoing final wiring. The high current driver and isolator boards have been completed and installed, and the main interface board is under construction. The automated vacuum chamber has had a minor redesign to increase stiffness and improve the cover open/close mechanism. Design of the Final Assembly Station has been completed and construction is underway.
Author

N81-23622*# Pennsylvania Univ., Philadelphia. Moore School of Electrical Engineering.
ANALYSIS AND EVALUATION IN THE PRODUCTION PROCESS AND EQUIPMENT AREA OF THE LOW-COST SOLAR ARRAY PROJECT Quarterly Report, Jul. - Oct. 1980
M. Wolf and H. Goldman Jan. 1981 174 p Sponsored in part by DOE Prepared for JPL
(Contract JPL-954796)
(DOE/JPL-954796-81/12; JPL-9950-534) Avail: NTIS HC A08/MF A01 CSCL 10A

The attributes of the various metallization processes were investigated. It is shown that several metallization process sequences will lead to adequate metallization for large area, high performance solar cells at a metallization add on price in the range of $6. to 12. m squared, or 4 to $.8/W(peak), assuming 15% efficiency. Conduction layer formation by thick film silver or by tin or tin/lead solder leads to metallization add-on prices significantly above the $6. to 12/m squared range c.) The wet chemical processes of electroless and electrolytic plating for strike/barrier layer and conduction layer formation, respectively, seem to be most cost effective.
R.C.T.

N81-23623*# Acurex Corp., Mountain View, Calif. Alternate Energy Div.
ADVANCED SOLAR CONCENTRATOR: PRELIMINARY AND DETAILED DESIGN Final Report
D. M. Bell, R. A. Maraschin, M. T. Matsushita, D. Erskine, R. Carlton, A. Jakovcevic, and A. K. Yasuda Mar. 1981 252 p (Contracts NAS7-100; JPL-955477; Acurex Proj. 7740)
(NASA-CR-164316; ACUREX-FR-80-16/AE) Avail: NTIS HC A12/MF A01 CSCL 10A

A single reflection point focusing two-axis tracking paraboloidal dish with a reflector aperture diameter of approximately 11 m has a reflective surface made up of 64 independent, optical quality gores. Each gore is a composite of a thin backsilvered mirror glass face sheet continuously bonded to a contoured substrate of lightweight, rigid cellular glass. The use of largely self-supporting gores allows a significant reduction in the weight of the steel support structure as compared to alternate design concepts. Primary emphasis in the preliminary design package for the low-cost, low-weight, mass producible concentrator was placed on the design of the higher cost subsystems. The outer gore element was sufficiently designed to allow fabrication of prototype gores.
A.R.H.

N81-23624*# Acurex Corp., Mountain View, Calif. Alternate Energy Div.
ADVANCED SOLAR CONCENTRATOR: EXECUTIVE SUMMARY Final Report
Mar. 1981 42 p refs
(Contract JPL-955477)
(NASA-CR-164318; ACUREX-FR-81-10/AE) Avail: NTIS HC A03/MF A01 CSCL 10A

The preliminary design of a point-focusing solar concentrator, consisting of a steerable space frame structure supporting a paraboloidal mirror glass reflector, is described. A mass production, operation, and maintenance cost assessment is presented. A conceptual evaluation of a modified concentrator design is included. The detailed design of one of the lightweight, structurally efficient reflective elements comprising the paraboloidal reflective surface is given.
J.D.H.

N81-23625*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE EFFECT OF MINORITY CARRIER MOBILITY VARIATIONS ON SOLAR CELL SPECTRAL RESPONSE
V. G. Weizer, M. P. Godlewski, and R. J. Trivisonno 1981 12 p refs Presented at the 15th Photovoltaic Spec. Conf., Kissimmee, Fla., 12-15 May 1981; sponsored by the IEEE
(NASA-TM-82604; E-852) Avail: NTIS HC A02/MF A01 CSCL 10A

Analysis of multistep diffused, high voltage 0.1 ohm-cm solar cells suggests that the increased voltage capability of these cells is correlated with localized variations in the base minority carrier mobility. An attempt to calculate the behavior of those cells revealed unexpected results. It is shown, contrary to what was expected, that spatial variations in the mobility effects severe changes in the short-circuit current and the spectral response. Variations in cell output as a result of imposing abrupt, linear, and exponential mobility variations are presented.
Author

N81-23626*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PERFORMANCE OF HIGH RESISTIVITY n+pp+ SILICON SOLAR CELLS UNDER 1 MeV ELECTRON IRRADIATION
I. Weinberg, C. Goradia, C. K. Swartz, and A. M. Hermann 1981 12 p refs Presented at the 15th Photovoltaic Specialists Conf., Kissimmee, Fla. 12-15 May 1981; sponsored by the IEEE
(NASA-TM-82610; E-856) Avail: NTIS HC A02/MF A01 CSCL 10A

High resistivity (1250 and 84 ohm-cm) n(+)pp(+) silicon solar cells were irradiated and their performance evaluated as a function of fluence. The greatest degradation in power occurred for the higher resistivity cell. The data were analyzed under open circuit conditions, and the components of V sub oc determined as a function of fluence. It was found that the voltage contributions from the front and back junctions decreased while the base component (V sub B) increased with fluence. The anomalous behavior of V sub B was attributed to an increase in the base minority carrier gradient with fluence. An argument that the increased power degradation in the 1250 ohm-cm cells was attributable to an increased voltage drop in the base is presented. Diffusion lengths calculated under high injection conditions were significantly greater than those determined under low injection. This was attributed to a saturation of recombination centers under high injection conditions. Author

N81-23627*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REDUCED ANNEALING TEMPERATURES IN SILICON SOLAR CELLS
I. Weinberg and C. K. Swartz 1981 10 p refs Presented at the 15th Photovoltaic Spec. Conf., Kissimmee, Fla., 12-15 May 1981; sponsored by the IEEE
(NASA-TM-82597; E-842) Avail: NTIS HC A02/MF A01 CSCL 10A

Cells irradiated to a fluence of 5x10,000,000,000,000/square cm showed short circuit current on annealing at 200 C, with complete annealing occurring at 275 C. Cells irradiated to 100,000,000,000,000/square cm showed a reduction in annealing temperature from the usual 500 to 300 C. Annealing kinetic studies yield an activation energy of (1.5 + or - 2) eV for the low fluence, low temperature anneal. Comparison with activation energies previously obtained indicate that the presently obtained activation energy is consistent with the presence of either the divacancy or the carbon interstitial carbon substitutional pair, a result which agrees with the conclusion based on defect behavior in boron-doped silicon. S.F.

N81-23628# Air Force Academy, Colo. Dept. of Civil Engineering.
THE UNITED STATES AIR FORCE ACADEMY SOLAR ENERGY RESEARCH PROJECT: SOLAR TEST HOUSE Final Interim Report, May 1978 - Jan. 1980
Anthony Eden, Joel D. Benson, Kenneth A. Cornelius, and Gregory E. Riggs Jul. 1980 170 p refs
(AF Proj. 2054)
(AD-A097212; AFESC/ESL-TR-80-34) Avail: NTIS HC A08/MF A01 CSCL 13/1

This research continued to gather operational performance data and maintenance experience on a retrofit residential solar space heating system. Data analysis includes comparison to prior years: results. Separate chapters are devoted to analyzing the performance of evacuated tube collectors and the home's reaction to sole dependency on solar energy during a selected winter period. Considerable attention is given to actions that were taken to prepare the system for a return to normal occupancy (the home was vacant until October 1979). Information concerning the perceived need for development of an operations and maintenance manual and a 'homeowner's' manual is included. Complete copies of the developed manuals are appendices to this report. Author (GRA)

N81-23629# Naval Postgraduate School, Monterey, Calif.
ANALYTICAL TREATMENT OF GRAVITY EFFECTS ON GAS LOADED VARIABLE CONDUCTANCE HEAT PIPES M.S. Thesis
David Charles Kane Dec. 1980 46 p refs
(AD-A097679) Avail: NTIS HC A03/MF A01 CSCL 20/13

The formulation of a one-dimensional analytical model representing steady state operation of a vertically oriented gas loaded variable conductance heat pipe is presented. The model includes not only the effects of binary mass diffusion and axial pipe-wall conduction, but also gravitational effects which exist at the vapor-gas interface region when the molecular weights of the working fluid and the noncondensible gas differ significantly. Analytical expressions for the transport processes (mass, momentum, and energy) along with equations of state result in a system of ten equations which describe steady state operation of the device. Combining these expressions yields a system of two simultaneous highly non-linear differential equations. These equations are non-dimensionalized and set up for numerical integration using a variable step fourth order Runge Kutta method as part of IBM's Continuous System Modeling Program (CSMP). Author (GRA)

N81-23630# Londe-Parker-Michels, Inc., St. Louis, Mo.
WINTER EXPERIENCE OF A PASSIVE SOLAR RETROFIT Final Technical Report
T. I. Michels and F. S. Andes 23 Dec. 1980 8 p Presented at the Colloq. Solaire Intern., Nice, France, 11 Dec. 1980
(Contract DE-FG04-77CS-34127)
(DOE/CS-34127/1; CONF-801218-3) Avail: NTIS HC A02/MF A01

An older home in St. Louis had 2 inch foam insulation added to the outside of masonry walls with stucco exterior finish applied. The south wall was modified so that there is a gross solar collection area of 26.2 square m, with 13.2 square m of greenhouse, 8.6 square m of direct gain and 4.4 square m of Trombe components. The performance of the building and its data acquisition system are described. DOE

N81-23631# Sterling Hobe Corp., Washington, D.C.
MARKET STUDY FOR DIRECT UTILIZATION OF GEOTHERMAL RESOURCES BY SELECTED SECTORS OF ECONOMY
Aug. 1980 225 p
(Contract DE-AC01-80RA-50108)
(DOE/RA-50108/T1) Avail: NTIS HC A10/MF A01

A comprehensive analysis is presented of industrial markets potential for direct use of geothermal energy by a total of six industry sectors: food and kindred products; tobacco manufactures; textile mill products; lumber and wood products (except furniture); chemicals and allied products; and leather and leather products. Location determinants and potential for direct use of geothermal resources are presented. The data was gathered through interviews with 30 senior executives in the six sectors of economy selected for study. Probable locations of plants in geothermal resource areas and recommendations for geothermal resource marketing are presented. DOE

N81-23632# Rockwell International Corp., Anaheim, Calif. Electronic Devices Div.
THIN FILMS OF InP FOR PHOTOVOLTAIC ENERGY CONVERSION Final Report, 5 Jul. 1979 - 4 Jul. 1980
Harold M. Manasevit, Ralph P. Ruth, Lavada A. Moudy, Jane J. J. Yang, and Richard E. Johnson Aug. 1980 164 p refs
(Contract DE-AC02-79ET-23004)
(COO-3004-4; C80-331/501) Avail: NTIS HC A08/MF A01

Research to develop a low cost high efficiency thin film InP heterojunction solar cell, using the metalorganic chemical vapor deposition (MD-CVO) technique for InP film growth on suitable substrates is reported. The research effort involved three major technical tasks: materials growth; materials characterization; and device fabrication and characterization. Temperature-activated orientation-dependent background donor doping was observed in undoped epitaxial InP films. P type epitaxial films of InP were prepared by Zn and by Cd doping during growth. The efficacy of Cd doping was found to vary exponentially with the reciprocal of the deposition temperature in the range 650 to 730 C. T.M.

N81-23633# Electric Power Research Inst., Palo Alto, Calif.
ELECTRIC UTILITY SOLAR ENERGY ACTIVITIES: 1980 SURVEY Special Report, Dec. 1980
Mary C. Wentworth Dec. 1980 283 p
(EPRI-AP-1713-SR) Avail: NTIS HC A13/MF A01

Brief descriptions of 839 projects being conducted by 236 utility companies are given. Also included are an index of

projects by category, a statistical summary, a list of participating utilities with information contacts and addresses, a list of utilities with projects designated by category, a list of utilities organized by state, a list of available reports on utility-sponsored projects, and a list of projects having multiple utility participants. Project categories include solar heating and cooling of buildings, wind energy conversion, solar thermal electric power, photovoltaics, biomass conversion, process heat, and ocean energy conversion. DOE

N81-23634# Global Weather Consultants, Inc., San Jose, Calif.
WIND ENERGY RESOURCE ATLAS. VOLUME 9: THE SOUTHWEST REGION
R. L. Simon, G. T. Norman, D. L. Elliott, W. R. Barchet, and R. L. George Nov. 1980 128 p refs Prepared for Battelle Pacific Northwest Labs
(Contract DE-AC06-76RL-01830)
(PNL-3195WERA-9-Vol-9) Avail: NTIS HC A07/MF A01

This atlas is composed of introductory and background information, a regional summary of the wind resource, and assessments of the wind resource in Nevada and California. Background on how the wind resource is assessed and on how the results of the assessment should be interpreted is presented. A description of the wind resource on a regional scale is then given. The results of the wind energy assessments for each state are assembled into an overview and summary of the various features of the regional wind energy resource. An introduction and outline to the descriptions of the wind resource given for each state are given. DOE

N81-23635# Eisenstadt (Melvin) and Associates, Inc., Albuquerque, N. Mex.
ACCESS TO SOLAR ENERGY: THE PROBLEM AND ITS CURRENT STATUS
Melvin Eisenstadt Mar. 1981 48 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-7081) Avail: NTIS HC A03/MF A01

The problems of providing access to sunshine for solar energy systems are addressed. Legal methods for providing such access including easements, restrictive covenants, subdivision statutes and ordinances, nuisance laws, permit systems, state statutes creating solar access rights, and zoning are analyzed. Some methods protect solar access for potential solar collector sites as well as existing collectors, while others are usable only for collectors that are already installed. The different states, counties, and municipalities that use the various methods are identified. While each of the methods has its problems, zoning appears to be emerging as the most popular. For this reason, zoning for solar access is discussed in some detail. DOE

N81-23636# Energetics Corp., Richardson, Tex.
DIRECT APPLICATION OF GEOTHERMAL ENERGY AT THE L'EGGS PRODUCT PLANT, LAS CRUSES, NEW MEXICO Final Report
Gary N. Bond, John H. Boucher, Warren T. Eriksen, Steven L. Hudson, and Bryan D. Kaiser Feb. 1981 136 p refs
(Contract DE-AC07-79ID-12047)
(DOE/ID-12047/3) Avail: NTIS HC A07/MF A01

Five separate sites were evaluated initially as to geothermal potential and technical feasibility. Preliminary analysis revealed that three sites were considered normal, but that two sites (about three miles from the L'eggs Plant) had very high shallow subsurface temperature gradients. An initial engineering analysis showed that to meet the L'eggs plant temperature and energy requirements a geothermal fluid temperature of about 250 F and 200 gpm flow rate would be necessary. A brief economic comparison indicated that the L'eggs plant site and a geothermal site approximately four miles from the plant did merit further investigation. DOE

N81-23637# Dwyer-Mercer County District Public Library, Celina, Ohio.
SOLAR PASSIVE CEILING SYSTEM Final Report
Austin R. Schneider 1980 75 p
(Contract DE-FG02-79R5-10148)
(DOE/R5-10148/2) Avail: NTIS HC A04/MF A01

The construction of a 1200 square foot building, with full basement, built to be used as a branch library in a rural area is described. The primary heating source is a passive solar system consisting of a south facing window system. The system consists of: a set of windows located in the south facing wall only, composed on double glazed units; a set of reflectors mounted in each windoe which reflects sunlight up to the ceiling (the reflectors are similar to venetian blinds); a storage area in the ceiling which absorbs the heat from the reflected sunlight and stores it in foil salt pouches laid in the ceiling; and an automated curtain which automatically covers and uncovers the south facing window system. The system is totally passive and uses no blowers, pumps or other active types of heat distribution equipment. The building contains a basement which is normally not heated, and the north facing wall is bermed four feet high around the north side. DOE

N81-23638# General Atomic Co., San Diego, Calif.
RADIOISOTOPE SPACE POWER GENERATOR Annual Report, 1 Oct. 1976 - 30 Sep. 1978
N. B. Elsner, J. Chin, H. G. Staley, J. C. Bass, E. J. Steeger, P. K. Gantzel, and J. M. Neill Jan. 1980 151 p refs
(Contract DE-AT03-76SF-70060; GEN. ATOMIC Proj. 3246)
(GA-A-15683) Avail: NTIS HC A08/MF A01

Techniques for fabricating P-type (Cu,Ag)2Se with mesh-type bonds were developed. The N-type alloy Gd2Se3 was shown to be thermally unstable. It undergoes a sluggish cubic-to-orthorhombic phase change below 1000 C, with an accompanying degradation in mechanical and thermoelectric properties. Fabrication studies conducted with the (Bi,Sb)2(Se,Te)3 alloys showed these materials to be sensitive to oxygen contamination if repreducible properties are to be obtained. Preparation of powdered material by explosive techniques was investigated. This technique appears to be useful in preparing homogeneous -325 mesh material, but it does not yield a useful amount of submicorn-size powder. DOE

N81-23639# Hittman Associates, Inc., Columbia, Md.
MODELS FOR RESIDENTIAL-AND COMMERCIAL-SECTOR ENERGY CONSERVATION ANALYSIS: APPLICATIONS, LIMITATIONS, AND FUTURE POTENTIAL Final Report
Henry E. Cole and Robert E. Fuller Sep. 1980 193 p refs
(Contract DE-AC01-79PE-70044)
(DOE/PE-70044/T3; H-C1011/002-80-948F) Avail: NTIS HC A09/MF A01

Four of the major models used by DOE for energy conservation analyses in the residential and commercial building sectors are reviewed and critically analyzed to determine how these models can serve as tools for DOE and its Conservation Policy Office in evaluating and quantifying their policy and program requirements. The most effective role for each model in addressing future issues of buildings energy conservation policy and analysis is assessed. The four models covered are: Oak Ridge Residential Energy Model; Micro Analysis of Transfers to Households/ Comprehensive Human Resources Data System (MATH/CHRDS) Model; Oak Ridge Commercial Energy Model; and Brookhaven Buildings Energy Conservation Optimization Model (BECOM). DOE

N81-23640# Rockwell International Corp., Canoga Park, Calif. Energy Systems Group.
FINANCIAL STUDY OF COMMERCIALIZATION OF SOLAR CENTRAL RECEIVER POWER SYSTEMS Final Report
Mar. 1981 104 p refs
(Contract DE-AC03-80SF-11421)
(DOE/SF-11421/1; ESG-80-38) Avail: NTIS HC A06/MF A01

Commercialization requires that central receiver (CR) systems meet the economic criteria used by industry to select systems for capital ventures. Quantitative estimates are given of the investment required by government, utilities, and the manufacturing sector to meet the energy displacement goals for central receiver technology. Initial solar repowering and stand-alone electric utility plants will not have economic comparability with competitive energy sources. A major factor for this is that initial (first of a kind) heliostat costs will be high. As heliostat costs are reduced due to automated manufacturing economies, learning, and high volume production, central receiver technology will become more competitive. Under this task, several scenarios (0.1, 0.5, and 1.0 quad/y) were evaluated to determine the

effect on commercial attractiveness and to determine the cost to government to bring about commercialization of solar central receivers. DOE

N81-23641# Radiation Monitoring Devices, Inc., Watertown, Mass.
HIGH EFFICIENCY THIN FILM CdTe SOLAR CELLS Quarterly Progress Report, 1 Jul. -30 Sep. 1980
B. Johnson, H. B. Serreze, G. Reiff, G. Entine, and R. B. Goldner Nov. 1980 28 p refs
(Contract DE-AC02-77CH-00178)
(SERI/PR-9133-1-T1; QPR-2) Avail: NTIS HC A03/MF A01

Thin films of CdTe were vacuum deposited onto glass and ITO-coated glass substrates using a hot-wall technique. Improved source conditions and system cleanliness enabled large pinhole-free regions capable of providing large area evaporated Au devices (greater than 1 cm(2)). An optimized Au thickness was determined and characterized in terms of sheet resistance and optical transmission. An evaporated Au/Ag combined grid and a SiO Ar coating yielded 1 sq cm active area Au-CdTe-ITO devices with J/sub sc/ = 13 mA/sq cm and /sub oc/ of 0.43 volt. The 1.4% efficiency is only temporarily limited by the uncharacteristically low 0.25 fill factor which is believed to be caused by an anomaly near the ITO contact. A three-source system with effusion cell type sources and a rotary shutter was designed, built, and successfully tested; it should improve control over film and device reproducibility and also provide greater versatility in controlling doping concentration and film stoichiometry. The system offers possibilities for p-n junction deposition without breaking vacuum. DOE

N81-23642# Oak Ridge Associated Universities, Tenn. Inst. for Energy Analysis.
GLOBAL ENERGY CONSUMPTION AND PRODUCTION IN 2000
Edward L. Allen, Carole DAvison, Rayola Dougher, James A. Edmonds, and John Reilly Feb. 1981 57 p
(Contract DE-AC05-76OR-00033)
(ORAU/IEA-81-2(M)) Avail: NTIS HC A04/MF A01

This study anticipates that global energy demand will continue to expand through 2000, although at a slower pace than in 1965 to 1978. Growth of supply is expected to be largely in conventional, nonrenewable fuels - coal, oil, uranium, and natural gas. Energy growth is also expected to slow down in terms of energy consumption per unit of output as a consequence of continuing efficiency improvements, which, in turn, result from higher energy prices. Slower rates of economic growth are expected in all groups of countries, developed and underdeveloped. DOE

N81-23643# Systems Control, Inc., Palo Alto, Calif.
SYSTEM INTEGRATION ISSUES OF RESIDENTIAL SOLAR PHOTOVOLTAIC SYSTEMS
Zia A. Yamayee and John Peschon Mar. 1980 99 p refs
(Contract DE-AC01-79ET-29349)
(DOE/RA-29349/01) Avail: NTIS HC A05/MF A01

The economic effects of residential solar PV systems on the utility's revenue, capacity, and energy requirements from the electric utility's perspective are evaluated. The price that it might pay for surplus energy and what it would charge for deficits are compared. The power and energy generated by the solar PV systems reduce the capital and operating costs that would otherwise be incurred by the utility. These avoided costs suggest what the utility might pay for surplus solar PV energy. The avoided costs are evaluated under three integration hypotheses, namely: (1) the utility has no system storage; (2) the utility has system storage; and (3) the solar PV systems are supported by dedicated storage devices, the purpose of which is to minimize sales to and purchases from the utility. DOE

N81-23644# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
ANALYSES OF MIXED-HYDROCARBON BINARY THERMODYNAMIC CYCLES FOR MODERATE-TEMPERATURE GEOTHERMAL RESOURCES
O. J. Demuth Feb. 1981 22 p refs Prepared in cooperation with Idaho National Engineering Lab., Idaho Falls
(Contract DE-AC07-76ID-01570)
(EGG-PG-G-80-041) Avail: NTIS HC A02/MF A01

Both boiling and supercritical shell-and-tube cycles were considered. The performance of a dual-boiling isobutane cycle supplied by a 280 F hydrothermal resource (corresponding to the 5 MW pilot plant at the Raft River site in Idaho) was selected as a reference. To investigate the effect of resource temperature on the choice of working fluid, several analyses were conducted for a 360 F hydrothermal resource, which is representative of the Heber resource in California. The hydrocarbon working fluids analyzed included methane, ethane, propane, isobutane, isopentane, hexane, heptane, and mixtures of those pure hydrocarbons. For comparison, two fluorocarbon refrigerants were also analyzed. DOE

N81-23645# Little (Arthur D.), Inc., Cambridge, Mass.
LARGE WIND TURBINE GENERATOR PERFORMANCE ASSESSMENT Interim Status Report, No. 2
W. A. Vachon Dec. 1980 77 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1348-1)
(EPRI-AP-1641; TSR-2) Avail: NTIS HC A05/MF A01

This report is the second in a series documenting a project whose main objective is to communicate the significant results of federal and privately funded large wind turbine (WT) generator development and field tests. This information is being communicated primarily to the electric utility industry. DOE

N81-23646# Varian Associates, Palo Alto, Calif.
MATERIALS FOR HIGH EFFICIENCY MONOLITHIC MULTIGAP CONCENTRATOR SOLAR CELLS Semiannual Report, 1 Jul. - 31 Dec. 1980
1980 25 p refs
(Contract DE-AC02-77CH-00178)
(SERI/TR-8081-1-T3) Avail: NTIS HC A02/MF A01

Material technologies were directed towards the development of a two-gap, monolithic, lattice-matched concentrator cell with 28 percent or higher AM2 conversion efficiency at 500 to 1000 suns. The work performed is subdivided into the five major tasks: develop and demonstrate the technology for a grading layer of GaInAs/GaAs and low bandgap cells in AlGaInAs/GaInAs/GaAs; develop and demonstrate intercell tunnel junction contacts in the higher bandgap AlGaInAs alloys; develop and demonstrate technology for a higher bandgap concentrator cell in AlGaInAs alloys; demonstrate a complete two gap monolithic concentrator cell with AM2 efficiency of 28 percent or more; and investigate the potential of AlInAsSb alloys grown on InAs substrates. T.M.

N81-23647# Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
PERFORMANCE OF ACTIVE SOLAR SPACE-COOLING SYSTEMS: THE 1980 COOLING SEASON
D. Blum, S. Frock, T. Logee, D. Missal, and P. Wetzel 1980 155 p refs
(Contract DE-AC01-79CS-30027)
(SOLAR/0023-81/40) Avail: NTIS HC A08/MF A01

Solar cooling by an absorption chiller is not a cost effective method to use solar heat. This statement is substantiated by careful analysis of each subsystem and equipment component. Good designs and operating procedures are identified. The problems which reduce cost effectiveness are pointed out. There are specific suggestions for improvements. Finally, there is a comparison of solar cooling by absorption chilling and using photovoltaic cells. DOE

N81-23648# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
VACUUM-DEPOSITED POLYCRYSTALLINE SILICON FILMS FOR SOLAR-CELL APPLICATIONS Final Technical Report, 14 Sep. 1979 - 1 Dec. 1980
Charles Feldman, Charles H. Arrington, III, Norman A. Blum, and Frank G. Satkiewicz Dec. 1980 184 p refs
(Contracts DE-AC02-77CH-00178; ET-78-A-03-2208)
(SERI/TR-8278-1-T4) Avail: NTIS HC A09/MF A01

A process was explored in which the solar cell was constructed in layers as follows: alumina (or sapphire) substrate/TiB2 bottom electrode/p-type polycrystalline silicon film/n-type polycrystalline silicon film/Ti-Ag top electrode. Techniques were developed for

forming stable, low resistivity thin films of TiB2. The p-layer was vacuum deposited by electron beam heating of Si and B sources. The n-layer was formed both by thermal diffusion and by silicon deposition in a phosphine atmosphere. Both methods yielded photodiodes; the diffused junctions were studied more extensively and consequently produced the higher efficiency devices. DOE

N81-23649# Stuttgart Univ. (West Germany). Inst. fuer Kernenergetik und Energie-systeme
STUDY OF A TEMPERATURE-STABILIZED HEAT PIPE SYSTEM WITH ELECTRICAL FEEDBACK Ph.D. Thesis
M. Hage Jun. 1980 128 p refs In GERMAN
(IKE-5-196) Avail: NTIS (US Sales Only) HC A07/MF A01; DOE Depository Libraries

The experimental and theoretical study of a gas-stabilized ammonia-argon heat pipe feedback system is aimed at achieving very precise temperature stabilization of a heat source to which the heat pipe system is coupled thermally. The influences of a number of parameters upon the heat carrying capability and precision of control of the heat pipe system are studied, both with respect to steady state and dynamic behavior, e.g., of variable operating temperatures changing cooling temperature conditions of the cooling zone and the reservoir, and the necessary auxiliary power of the reservoir heater. Theoretical predictions are made on the basis of numerical calculation. This includes modification of an existing computer program, FEDCON. The prediction is established by thermal decoupling of cooling zone and reservoir modes of cooling. Changes in the boundary conditions also allow a heat pipe system to be calculated for control of any temperature within a specified range of temperatures. DOE

N81-23650# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DETECTION OF ELECTRICALLY FAILED PHOTOVOLTAIC MODULES AT MIT LL TEST SITES
S. E. Forman Feb. 1981 27 p refs
(Contract DE-AC02-76ET-20279)
(DOE/ET-20279/112) Avail: NTIS HC A03/MF A01

These sites contain modules from several manufacturers and serve as test beds for photovoltaic system components. Between May 1977 and the present, over 11,000 modules were placed into service at these sites, with a total of approximately 250 electrical failures. Emphasis has been placed on failure modes and the types of physical and electrical degradation found in modules. The methods used to detect these failures in operational photovoltaic power-generating systems are reported. DOE

N81-23651# United Technologies Corp., South Windsor, Conn. Power Systems Div.
MOLTEN CARBONATE FUEL CELL SYSTEM VERIFICATION AND SCALE-UP Interim Report
J. M. King and C. A. Reiser Jan. 1981 74 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1273-1)
(EPRI-EM-1481) Avail: NTIS HC A04/MF A01

The primary goal is to demonstrate the operability of a molten carbonate cell stack, an advanced fuel processor and critical system components in a subscale power plant context. Technical tasks include: testing a nominal 2 kW stack of the configuration resulting from other EPRI sponsored work (RP114-2), and testing a nominal 2 kW stack design at elevated pressures, drawing from the process development and design activities being carried out in complementary projects. DOE

N81-23652# Battelle Inst., Frankfurt am Main (West Germany). Solid State Physics Sect.
DEVELOPMENT OF SINGLE-CRYSTALS CdTe SOLAR CELLS FOR TERRESTRIAL APPLICATION IN OPTICAL CONCENTRATORS Final Report
Hans Jaeger, Bernd Fuessl, Emil Seipp, and Rita Thiel Dec. 1980 84 p refs
(BMFT-FB-T-80-060) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

Semitransparent Au-Schottky barrier contacts and p-type ZuTe layers were evaporated on n-type CdTe wafers to form photovoltaic structures. CdS and indium tin oxide (ITO) layers, both of n-type, were deposited on p CdTe wafers. Schottky diodes on n CdTe exhibit a high photocurrent. ZnTe was found to be of high resistivity; however, it was possible to deposit low resistivity transparent ZnTe layers. First solar cell samples of n CdS and ITO on p CdTe yielded 3% cell efficiency. The ohmic contacts on p type CdTe are the critical element in this case. The solar cells of p CdTe/n CdS (or ITO) seem to be the better approach. Concentrator applications will presumably not be possible because the contact resistances are not low enough. DOE

N81-23653# Varta Batterie A.G., Kelkheim (West Germany). Research and Development Center.
DEVELOPMENT OF A LEAD-ACID BATTERY WITH HIGH ENERGY AND POWER DENSITY Final Report
Karl-Ernst Baufeldt, Waldemar Borger, and Reinhard Braeutigam Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 221 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-80-151) Avail: NTIS (US Sales Only) HC A10/MF A01; DOE Depository Libraries

The energy density of lead acid cells was increased to more than 50 Wh5/kg by means of forced electrolyte flow through the active materials, and also by means of a construction method with a chequered electrode arrangement based on minimized electrolytic and electronic conduction paths, and on optimized volume/surface area proportion. At the one hour discharge the energy density is twice that of the MAN-bus cell. It is concluded that the energy density of the lead acid system can be increased to 60 Wh5/kg. The antimony-free effect causing the premature failure of cells in cycle tests, can be explained on the basis of a model. The expander depot and a method of rejuvenating negative plates were developed. This procedure was successfully applied to a MAN-bus battery with reference to the battery periphery, experience on a H2/O2 gas recombination device resulted in a hermetically sealed lead acid cell for electric vehicles. For the remote control of the state of charge, an indicator with automatic temperature compensation was developed. DOE

N81-23654# Department of Energy, Washington, D. C. Energy Information Administration.
SHORT-TERM ENERGY OUTLOOK. VOLUME 2: METHODOLOGY
Aug. 1980 73 p refs Sponsored by DOE
(DOE/EIA-0202/4-Vol-2) Avail: NTIS HC A04/MF A01

Volume II includes sections on the Short-Term Integrated Forecasting System (STIFS), on Factors Affecting the Level of Primary Petroleum Inventories and on the Forecasting Methodology for Petroleum Balances in STIFS. Natural gas and residual fuel oil pricing, modeling of petroleum-product and electricity demands are included. The Appendix provides a table of the conversion factors used in the STIFS system. DOE

N81-23655# Department of Energy, Washington, D. C. Office of Market Analysis.
INTERNATIONAL ENERGY INDICATORS
Elizabeth K. Bauer, ed. Feb. 1981 29 p
(DOE/IA-0010/8) Avail: NTIS HC A03/MF A01

Extensive data are compiled for energy on the international scene and for the US. Data included are: world crude oil production, 1975 to date; Iran: crude oil capacity, production, and shut-in, 1974 to date; Saudi Arabia: crude oil capacity, production, and shut-in, 1974 to date; OPEC (Ex-Iran and Saudi Arabia): capacity, production, and shut-in, 1974 to date; oil stocks: Free World, US, Japan, and Europe (landed), 1973 to date; petroleum consumption by industrial countries, 1973 to date; USSR crude oil production, 1974 to date; Free World and US nuclear generation capacity, 1973 to date. Data are supplied specifically for the US on US gross imports of crude oil and products, 1973 to date; landed cost of Saudi crude in current and 1974 dollars; US trade in bituminous coal, 1973 to date; summary of US merchandise trade, 1976 to date; and energy/GNP ratio. DOE

N81-23656# Arkansas Power and Light Co., Little Rock.
RESEARCH AND DEVELOPMENT OF A 3 MW POWER PLANT FROM THE DESIGN, DEVELOPMENT, AND DEMONSTRATION OF A 100 KW POWER SYSTEM UTILIZING THE DIRECT CONTACT HEAT EXCHANGER CONCEPT FOR GEOTHERMAL BRINE RECOVERY PROJECT Final Report

Albert W. Huebner, Dennis A. Wall, and Thomas L. Herlacher
Sep. 1980 140 p refs
(Contract DE-FG05-78ET-28456; Grant ET-78-G-05-5917)
(DOE/ET-28456/T1) Avail: NTIS HC A07/MF A01

The design phase for the 100 KW unit consumed the months of May through November 1978, with the final design having a direct contact boiler and condenser, a single-stage radial inflow induction turbine generator using isopentane as the working fluid, and a single cell ejector-type cooling tower. The unit was constructed on two, forty-foot flatbed trailers between the months of October 1978 and June 1979. Systems start-up testing, in-field modifications, unit operation, and performance testing were performed between July and December 1979. AP and L (Arkansas Power and Light) personnel assumed responsibility of the unit at that time and conducted further maintenance, operations, and testing through August 1980. DOE

N81-23657# Veda, Inc., Camarillo, Calif.
ECONOMIC ANALYSIS OF THE UNIFIED HELIOSTAT ARRAY Final Report
31 Jan. 1981 430 p
(Contract DE-AC03-80SF-10802)
(DOE/SF-10802/1) Avail: NTIS HC A19/MF A01

Two heliostats, the Veda Industrial Heliostat (VIH) and the Repowering Heliostat were investigated in conjunction with the UHA. The UHA was found to be a viable candidate for solar thermal central receiver applications. The UHA-VIH combination was shown to provide very high flux densities and to be suitable for high temperature applications in the 10000 K to 20000 K range. These temperatures were shown to be achievable even with very small (1 MWt) collector fields. DOE

N81-23658# Telesis Lab., Chillicothe, Ohio.
MICROPROCESSOR CONTROL OF A GROUND WATER HEAT PUMP Final Report
1980 58 p
(Contract DE-FG02-75R5-10149)
(DOE/R5-10149/2) Avail: NTIS HC A04/MF A01

The energy savings available to a small well-insulated facility when a properly designed heat pump is operated against a source of constant temperature ground water or pond water is demonstrated. It is expected that a complete data log will be submitted next spring. Initial energy savings computations follow. The system efficiency is impressive. A typical winter day savings is about $24.00 or $720.00 monthly. The system utilizes the 550F ground water directly for summer cooling. The summer savings are estimated to be about $18.00/day or $540.00 monthly. Circuits and diagrams of the microprocessor control system and data logger are presented. Some sample data are included. DOE

N81-23659# Radiation Monitoring Devices, Inc., Watertown, Mass.
LOW COST SPRAYED CdTe SOLAR CELL RESEARCH Quarterly Progress Report, 15 Feb. - 14 May 1980
M. Squillante, R. Turcotte, S. Lis, H. B. Serreze, and G. Entine
Jun. 1980 21 p refs Prepared for Midwest Research Inst., Golden, Colo.
(Contract DE-AC02-77CH-00178)
(SERI/PR-8104-3-T1; QPR-3) Avail: NTIS HC A02/MF A01

Experiments were carried out to optimize the conditions of the chemical reaction and the physical parameters of the spray process in order to produce high quality CdTe thin films. Films containing 95% or more of CdTe were produced by the reaction of (MH4) 2TeO4 with cadmium salts in the presence of a reducing agent. The physical quality of the films improved so that recent ones have been smoother and more uniform. Furthermore, photoconductive effects were observed in many of the films. This progress is partly due to the removal of oxygen by an efficient purge of the spray box and partly due to an increased understanding and control of the spray pyrolysis process. DOE

N81-23660# Rockwell International Corp., Thousand Oaks, Calif. Electronics Research Center.
DEVELOPMENT OF POLYCRYSTAL GaAs SOLAR CELLS Technical Progress Report, 15 Jan. - 30 Sep. 1980
D. L. Miller, Marshall J. Cohen, and J. S. Harris, Jr. Oct. 1980 13 p Prepared for Midwest Research Inst., Golden, Colo.
(Contract DE-AC02-77CH-00178)
(SERI/PR-8032-1-T1) Avail: NTIS HC A02/MF A01

Schottky diodes were made on epitaxial GaAs layers grown by molecular beam epitaxy on polycrystal substrates with grain size from 1 to 10 mm; the measured dark forward current-voltage characteristics are plotted. The modeling method and calculated plots of current-voltage characteristics with grain size as a parameter, open circuit voltage and short circuit current vs grain size, and efficiency and fill factor vs grain size for Schottky barrier polycrystal solar cells are given and discussed. DOE

N81-23661# Telic Corp., Santa Monica, Calif.
CADMIUM SULFIDE/COPPER SULFIDE HETEROJUNCTION CELL RESEARCH BY SPUTTER DEPOSITION Quarterly Technical Progress Report, 2 Sep. - 30 Nov. 1980
John A. Thornton, William W. Anderson (Lockheed Aircraft Corp., Palo Alto, Calif.), and John D. Meakin 15 Dec. 1980 77 p refs Prepared for Midwest Research Inst., Golden, Colo.
(Contract DE-AC02-77CH-00178)
(TELIC-80-3) Avail: NTIS HC A05/MF A01

Photoluminescence measurements of sputter-deposited CDs films were made. In a series of tests thin films of both doped and undoped CdS, deposited under reactive sputtering conditions typical of those used in previous cell fabrication, were found to be void of any photoluminescence emission in the visible spectrum. Subsequent tests of thicker films deposited under various conditions showed emission from the undoped but not from the doped material. A post-deposition treatment process, where CdS films are cooled following deposition in a flux of sputtered Cd, proves to be the most effective method examined for producing off stoichiometric coatings with low resistivities (less than 100 (LAMBDA)-cm). The treated films are found to exhibit a photoluminescence emission. Optimization of the composition and thickness of the sputtered Cu2S should yield cells with efficiencies equivalent to those obtained with conventional ion exchange processing methods. DOE

N81-23662# Rust Engineering Co., Birmingham, Ala.
ADVANCED SYSTEM DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE. SITE STUDY REPORT
Oct. 1980 65 p Revised Prepared in cooperation with Wheelabrator Cleanfuel Corp. 8 Vol.
(Contracts DE-AC06-77ET-20055; EG-77-R-06-1036)
(DOE/ET-20055/T1) Avail: NTIS HC A04/MF A01

Westbrook, Maine was selected as the site for the construction of a biomass cogeneration plant. The evaluation of sites was based on comparison of variables such as: adequate biomass availability; cogeneration potential (market for steam produced); water availability; air quality compliance; access roads; site area required; and adequate tie-ins with electric power grids for sale of electricity produced. DOE

N81-23663# Rust Engineering Co., Birmingham, Ala.
ADVANCED SYSTEM DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE. VOLUME 1: SCOPE AND DESIGN CRITERIA AND PROJECT SUMMARY
Oct. 1980 337 p Revised Prepared in cooperation with Wheelabrator Cleanfuel Corp. 8 Vol.
(Contracts DE-AC06-77ET-20055; EG-77-R-06-1036)
(DOE/ET-20055/T2-Vol-1) Avail: NTIS HC A15/MF A01

A generic design is presented for biomass conversion facilities located anywhere biomass is abundant. The plant, its concept of operation, and other overall information are described. The capital cost estimate for the plant, and the basis upon which it was obtained are given; a schedule of key milestones and activities required to construct the plant and put it into operation is presented; and the general findings in areas that affect the viability of the project are discussed. The technical design, biomass study, environmental impact, commercialization, and economic factors are addressed. Each major plant area and its equipment and facilities are discussed as well as noise control, reliability, maintainability, and safety. The results of studies relating to alternatives considered for optimizing plant operation parameters and specific system process schemes are presented. All economic factors that affect the feasibility and viability of the biomass project are defined and evaluated. DOE

N81-23664# Wheelabrator Cleanfuel Corp., Washington, D.C.
ADVANCED SYSTEMS DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE. VOLUME 2: TECHNICAL SPECIFICATIONS
Oct. 1980 600 p Revised 8 Vol.
(Contracts DE-AC06-77ET-20055; EG-77-R-06-1036)
(DOE/ET-20055/T2-Vol-2) Avail: NTIS HC A25/MF A01

Specifications relating to materials and construction of a biomass cogeneration facility in Maine are presented. DOE

N81-23665# Wheelabrator Cleanfuel Corp., Washington, D.C.
ADVANCED SYSTEMS DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE. VOLUME 3: EQUIPMENT SPECIFICATIONS
Oct. 1980 405 p Revised 8 Vol.
(Contracts DE-AC06-77ET-20055; EG-77-R-06-1036)
(DOE/ET-20055/T2-Vol-3-Bk-1) Avail: NTIS HC A18/MF A01

Specifications are given for the shipping, marking, inspection, testing, and start up of equipment to be used in a proposed wood fuel cogeneration system in Maine. Couplings, mechanical drives, electric motors, spare parts, coatings, assembling, and materials handling and packaging are covered. Both OSHA and noise control regulations are included along with the ASME code. A.R.H.

N81-23666# Wheelabrator Cleanfuel Corp., Washington, D.C.
ADVANCED SYSTEMS DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE. VOLUME 3, BOOK 2: EQUIPMENT SPECIFICATIONS
Oct. 1980 325 p Revised Prepared in cooperation with Rust Engineering Co. 8 Vol.
(Contracts DE-AC06-77ET-20055; EG-77-R-06-1036)
(DOE/ET-20055/T2-Vol-3-Bk-2) Avail: NTIS HC A14/MF A01

Specifications are given for the following equipment to be used in a proposed cogeneration plant in Maine in which wood and wood waste is to be used to generate steam: metal tanks and pressure vessels; bins for holding bark; pumps; heat exchangers; condensors; drying equipment; hammers; chlorination system; and the cooling tower. The scale is also stipulated for railroad track, woodyard motor trucks, and the belt conveyor. A.R.H.

N81-23667# Wheelabrator Cleanfuel Corp., Washington, D.C.
ADVANCED SYSTEM DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE. VOLUME 4: DESIGN DRAWINGS
Oct. 1980 671 p Revised 8 Vol.
(Contracts DE-AC06-77ET-20055; EG-77-R-06-1036)
(DOE/ET-20055/T2-Vol-4) Avail: NTIS HC A99/MF A01

Design drawings for a biomass cogeneration plant are presented which show a considerable degree of detail, but which are not to be considered released for construction. DOE

N81-23668# Wheelabrator Cleanfuel Corp., Washington, D.C.
ADVANCED SYSTEM DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE. EXECUTIVE SUMMARY
Oct. 1980 28 p Revised Prepared in cooperation with Rust Engineering Co. 8 Vol.
(Contracts DE-AC06-77ET-20055; EG-77-R-06-1036)
(DOE/ET-20055/T4-Exec-Summ) Avail: NTIS HC A03/MF A01

The feasibility of collecting 1000 oven dry tons of biomass per day to fuel a 510,000 lb/hr boiler operating in a cogeneration mode and producing steam and electricity was confirmed in a study based on the supply of a significant portion of the facility's biomass fuel by tree harvesting and collection operations within a 50 mile radius of the plant site. These operations, including transporting biomass to the conversion plant, pose no threat to the environment if good forestry practice is carefully maintained. Other environmental factors relating to air and water discharges from the conversion plant pose no significant technological problems in complying with federal, state, and local regulations at a cost that is competitive with similar costs associated with fossil fueled facilities. DOE

N81-23669# TRW Energy Systems Planning Div., McLean, Va.
CHARACTERIZATION OF ALTERNATIVE ELECTRIC GENERATION TECHNOLOGIES FOR THE SPS COMPARATIVE ASSESSMENT. VOLUME 1: SUMMARY OF CENTRAL STATION TECHNOLOGIES
Aug. 1980 27 p refs Prepared for Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(ANL/EES-TM-121-Vol-1) Avail: NTIS HC A03/MF A01

The technologies selected for the detailed characterization were: solar technology; terrestrial photovoltaic (200 MWe); coal technologies; conventional high sulfur coal combustion with advanced fine gas desulfurization (1250 MWe), and open cycle gas turbine combined cycle plant with low Btu gasifier (1250 MWe); and nuclear technologies: conventional light water reactor (1250 MWe), liquid metal fast breeder reactor (1250 MWe), and magnetic fusion reactor (1320 MWe). A brief technical summary of each power plant design is given. T.M.

N81-23670# TRW Energy Systems Planning Div., McLean, Va.
CHARACTERIZATION OF ALTERNATIVE ELECTRIC GENERATION TECHNOLOGIES SPS COMPARATIVE ASSESSMENT. VOLUME 2: CENTRAL-STATION TECHNOLOGIES
Aug. 1980 252 p refs Prepared for Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(ANL/EES-TM-121-Vol-2) Avail: NTIS HC A12/MF A01

The cost and performance (i.e., technical and environmental) characteristics of six central station energy alternatives are described. The alternatives are: conventional coal-fired powerplants; conventional light water reactors; combined cycle powerplants with low-Btu gasifiers; liquid metal fast breeder reactors; photovoltaic systems without storage; and fusion reactors. T.M.

N81-23671# Exxon Research and Engineering Co., Linden, N.J. Advanced Energy Systems Labs.
SOLAR THERMAL ENHANCED OIL RECOVERY, (STEOR) VOLUME 1: EXECUTIVE SUMMARY Final Report, 1 Oct. 1979 - 30 Jun. 1980
Eugene Elzinga, Charles Arnold, David Allen, Robert Garman, Patrick Joy, Paul Mitchell, and Henry Shaw Nov. 1980 38 p refs Prepared in cooperation with Foster Wheeler Development Corp. and Honeywell, Inc., Minneapolis 3 Vol.
(Contract DE-AC03-79CS-30307)
(SAN-0307-1-Vol-1) Avail: NTIS HC A03/MF A01

Thermal enhanced oil recovery is widely used in California to aid in the production of heavy oils. Steam injection either to stimulate individual wells or to drive oil to the producing wells, is by far the major thermal process today and has been in use for over 20 years. Since steam generation at the necessary pressures (generally below 4000 kPa (580 psia)) is within the capabilities of present day solar technology, it is logical to consider the possibilities of solar thermal enhanced oil recovery (STEOR). The present project consisted of an evaluation of STEOR. Program objectives, system selection, trade-off studies, preliminary design, cost estimate, development plan, and market and economic analysis are summarized. DOE

N81-23672# Exxon Research and Engineering Co., Linden, N.J. Advanced Energy Systems Lab.
SOLAR THERMAL ENHANCED OIL RECOVERY (STEOR), VOLUME 2, SECTIONS 2-8 Final Report, 1 Oct. 1979 - 30 Jun. 1980
Eugene Elzinga, Charles Arnold, David Allen, Robert Garman, Patrick Joy, Paul Mitchell, and Henry Shaw Nov. 1980 357 p refs Prepared in cooperation with Foster Wheeler Development Corp., Livingston, N.J. and Honeywell, Inc., Minneapolis 3 Vol.
(Contract DE-AC03-79CS-30307)
(SAN-0307-1-Vol-2) Avail: NTIS HC A16/MF A01

The technical, economic, operational, and environmental feasibility of solar thermal enhanced oil recovery using line focusing distributed collectors are determined. The quantity of solar heat which might be applied to domestic enhanced oil recovery is estimated. Selection of the solar system, trade-off studies, preliminary design for steam raising, cost estimate, the development plan, and a market and economics analysis are presented. DOE

N81-23673# Exxon Research and Engineering Co., Linden, N.J. Advanced Energy Systems Lab.

SOLAR THERMAL ENHANCED OIL RECOVERY (STEOR). VOLUME 2: APPENDICES Final Report, 1 Oct. 1979 - 30 Jun. 1980

Eugene Elzinga, Charles Arnold, David Allen, Robert Garman, Patrick Joy, Paul Mitchell, and Henry Shaw Nov. 1980 333 p refs Prepared in cooperation with Foster Wheeler Development Corp., Livingston, N.J. and Honeywell, Inc., Minneapolis 3 Vol.

(Contract DE-AC03-79CS-30307)

(SAN-0307-1-Vol-2-App) Avail: NTIS HC A15/MF A01

Detailed information describing the technical, economic, operational, and environmental feasibility of solar thermal enhanced oil recovery using line focusing distributed collectors is presented. The site description, conceptual designs, foundation design for solar collectors, design basis and preliminary design are given. The fatigue testing of flexible hoses is described. Solar control and a failure modes and effects analysis of solar thermal system are presented. The basis for the preliminary cost estimate and backup data for the market and economic analysis are presented. The environmental impact analysis and air quality analysis are given. Engineering drawings and specifications are included. J.D.H.

N81-23674# Exxon Research and Engineering Co., Linden, N.J. Advanced Energy Systems Labs.

SOLAR THERMAL ENHANCED OIL RECOVERY (STEOR). VOLUME 3: PRELIMINARY DESIGN FOR A PRE-HEAT ONLY SOLAR FACILITY Final Report, 1 Oct. 1979 - 30 Jun. 1980

Eugene Elzinga, Charles Arnold, David Allen, Robert Garman, Patrick Joy, Paul Mitchell, and Henry Shaw Nov. 1980 101 p Prepared in cooperation with Foster Wheeler Development Corp., Livingston, N.J. and Honeywell, Inc., Minneapolis 3 Vol.

(Contract DE-AC03-79CS-30307)

(SAN-0307-1-Vol-3) Avail: NTIS HC A06/MF A01

The preliminary design basis for a solar thermal enhanced oil recovery facility for preheating water supplied to existing boilers is presented. A total of 144 collectors, 6 feet wide and 120 feet long, are required. A projected site layout is given; the design basis, specifications, performance estimates, cost estimates, and schedule are presented. J.D.H.

N81-23675# Sandia Labs., Albuquerque, N. Mex. Experimental Systems Operation Div.

MIDTEMPERATURE SOLAR SYSTEMS TEST FACILITY PREDICTIONS FOR THERMAL PERFORMANCE BASED ON TEST DATA: SOLAR KINETICS T-600 SOLAR COLLECTOR WITH FEK 244 REFLECTOR SURFACE

Thomas D. Harrison Apr. 1981 23 p refs

(SAND-80-1964/9) Avail: NTIS HC A02/MF A01

A program to predict the performance and measure the characteristics of commercially available solar collectors with potential for use in industrial process heat and enhanced oil recovery applications is discussed. The thermal performance predictions for the Solar Kinetics T-600 solar line focusing parabolic trough collector are presented for three output temperatures at five cities in the US. DOE

N81-23676# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.

ELECTROCHEMICAL PHOTOVOLTAIC CELLS CdSe THIN FILM ELECTRODES Final Report, Jun. 1979 - Jun. 1980

Michael A. Russak, Joseph Reichman, Jerome DeCarlo, and Charles Creter Jul. 1980 63 p refs

(Contract DE-AC02-77CH-00178)

(SERI/TR-8002-8-T1; GAC-RE-604) Avail: NTIS HC A04/MF A01

Progress on developing stable, thin-film CdSe electrodes with sunlight conversion efficiency of 10% for use with aqueous polysulfide electrolytes in frontwall and backwall illuminated EPCs is reported. The main effort was directed towards establishing the relationships among thin-film processing, resultant electronic properties and I-V performance in order to produce electrodes with maximum power conversion efficiency. Films were deposited on titanium at approximately 100 C with a high Se/Cd ratio and then heat treated in air at 350 to 400 C. These films usually have a very fine grained microstructure after heat treatment and the resultant electrodes exhibit fairly square I-V characteristics with fill factors of 0.6 or greater and high current output. DOE

N81-23677# Wyoming Univ., Laramie. Dept. of Zoology and Physiology.

BIOASSAY OF POLYCYCLIC AROMATIC HYDROCARBONS M.S. Thesis

Edward A. VanKirk Aug. 1980 47 p refs

(Contract DE-AS02-77EV-04477)

(DOE/EV-04477/T2) Avail: NTIS HC A03/MF A01

A positive relationship was found between the photodynamic activity of 24 polycyclic aromatic hydrocarbons versus published results on the mutagenicity, carcinogenicity, and initiation of unscheduled DNA synthesis. Metabolic activation of benzo(a) pyrene resulted in detection of increased mutagenesis in Paramecium tetraurelia as found also in the Ames Salmonella assay. The utility of P. tetraurelia as a biological detector of hazardous polycyclic aromatic hydrocarbons is discussed. DOE

N81-23678# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Systems Technology Div.

PHOTOVOLTAIC UTILITY/CUSTOMER INTERFACE STUDY Final Report

C. H. Eichler, T. P. Hayes, M. M. Matthews, and V. F. Wilraker Dec. 1980 289 p refs

(Contract DE-AC04-76DP-00789)

(SAND-80-7061) Avail: NTIS HC A13/MF A01

The technical, economic, and legal and regulatory issues of interconnecting small, privately-owned, on-site photovoltaic generating systems to an electric utility are addressed. Baseline residential, commercial and industrial class photovoltaic systems were developed. Technical issues of concern affecting this interconnection were identified and included fault protection, undervoltage protection, lamp flicker, revenue metering, loss of synchromism, electrical safety, prevention of backfeeding a de-energized utility feeder, effects of on-site generation on utility relaying schemes, effects of power conditioner harmonic distortion on the electric utility, system isolation, electromagnetic interference and site power factor as seen by the utility. Typical interconnection wiring diagrams were developed for interconnecting each class of baseline photovoltaic generating system. DOE

N81-23679# Wood Energy Inst., Camden, Maine.

ADVANCED SYSTEM DEMONSTRATION FOR UTILIZATION OF BIOMASS AS AN ENERGY SOURCE

Oct. 1980 215 p refs Revised

(Contract EG-77-R-06-1036)

(DOE/ET-20055/T5) Avail: NTIS HC A10/MF A01

Efforts of a 20 month study to explore the technical and economic feasibility of fuelwood utilization to operate a 50 megawatt energy conversion facility are described. The availability of biomass as a fuel source, the methods of harvesting and collecting the fuelstock, the costs of providing adequate fuel to the plant, and other requirements for fueling the proposed conversion facility are investigated. DOE

N81-23680# Westinghouse Electric Corp., East Pittsburgh, Pa. Advanced Systems Technology Div.

ECONOMIC ASSESSMENT OF ADVANCED CENTRAL-RECEIVER SOLAR-THERMAL POWER SYSTEM. EXECUTIVE SUMMARY

Oct. 1980 23 p refs

(Contract DE-AC03-79SF-10601)

(DOE/SF-10601/T1) Avail: NTIS HC A02/MF A01

The impacts of interest included economics, the cost of producing electricity, fuels displaced, and utility system reliability. The central receiver plants evaluated included solar/fossil hybrid concepts and solar stand-alone plants with thermal storage. Liquid metal/molten salt, closed Brayton cycle, improved water-steam, and combined Brayton/Rankine cycle concepts were among those investigated. DOE

N81-23681# Westinghouse Electric Corp., East Pittsburgh, Pa. Advanced Systems Technology Div.

ECONOMIC ASSESSMENT OF ADVANCED CENTRAL-RECEIVER SOLAR-THERMAL POWER SYSTEMS Final Report

John T. Day, Roger F. Boyle, Michael J. Malone, David W. Doar, and W. G. Parker Oct. 1980 211 p refs
(Contract DE-AC03-79SF-10601)
(DOE/SF-10601/1) Avail: NTIS HC A10/MF A01

The value and potential electric utility impact of several advanced central receiver solar thermal plant concepts in the role of electric generating stations were estimated. The impact of interest included economics, the cost of producing electricity, fuels displaced, and utility system reliability. The central receiver plants evaluated included solar/fossil hybrid concepts and solar stand alone plants with thermal storage. Liquid metal/molten salt, closed Brayton cycle, improved water steam, and combined Brayton/Rankine cycle concepts were among those investigated. Detailed modeling of the operation of these plants, as they would operate on several electric utility systems, was the basis of the analysis. Analysis to optimize collector area and storage capacity was also performed. The study indicates that if the cost goals can be achieved and predicted solar plant performance attained, then the advanced solar thermal concepts can be competitive in regions with good insolation and some continued use of oil or other surrogate distillate or gaseous fuels. Some thermal storage (3 to 6 hours) was also found to be desirable for most applications. DOE

N81-23682# Westinghouse Electric Corp., East Pittsburgh, Pa. Advanced Systems Technology Div.
ECONOMIC ASSESSMENT OF ADVANCED CENTRAL-RECEIVER SOLAR-THERMAL POWER SYSTEMS: PG AND E ASSESSMENT
John T. Day, Roger F. Boyle, and David W. Doar Jan. 1981 53 p refs
(Contract DE-AC03-79SF-10601)
(DOE/SF-10601/2) Avail: NTIS HC A04/MF A01

The plants evaluated included solar/fossil hybrid concepts and solar stand-alone plants with thermal storage. Liquid metal/molten salt and combined Brayton/Rankine cycle concepts were investigated. The analysis was based on the operation of the Pacific Gas and Electric system with these plants modeled in detail on the system. Sensitivities to insolation site, collector area and thermal storage were investigated. The study indicates that if the DOE cost goals can be obtained along with the solar plant performance projected, the advanced central-receiver solar-thermal plants investigated can be economically justified on the Pacific Gas and Electric system. DOE

N81-23683# Virginia Polytechnic Inst. and State Univ., Blacksburg.
CdSiAs2 THIN FILMS FOR SOLAR CELL APPLICATIONS Quarterly Progress Report, 9 Apr. - 8 Jul. 1980
L. C. Burton Dec. 1980 16 p refs 2 Vol.
(Contract DE-AC02-77CH-00178)
(SERI-9143) Avail: NTIS HC A02/MF A01

The best CdSiAs2 films were obtained from a composite target (CdAs2 + Si), followed by post-deposition reactive heat treatments. The Perkin-Elmer Randex 2400 8J multitarget sputtering system was installed. Problems related to the J-arm, the RF power generator, RF shielding, water cooling, target switches, substrate bias network, vacuum gage controller, graphite heater elements and RF impedance matching network are discussed. Improvements were made in the magnetic field (van der Pauw), spectral response and variable temperature measurements facilities. DOE

N81-23684# Virginia Polytechnic Inst. and State Univ., Blacksburg.
CdSiAs2 FILMS FOR SOLAR CELL APPLICATIONS Quarterly Progress Report, 9 Jul. - 8 Oct. 1980
L. C. Burton Jan. 1981 17 p refs 2 Vol.
(Contract DE-AC02-77CH-00178)
(SERI-9143) Avail: NTIS HC A02/MF A01

Early problems associated with the Randex multitarget sputtering unit were rectified. CdAs2, Si and Cd targets were obtained from commercial vendors. Runs were made using CdAs2 and Si targets separately. The CdAs2 deposition rate falls off rapidly with increasing substrate temperature, but performed with CdAs2 and Si targets. Films on 7059 substrates are amorphous, with composition depending strongly on sputtering parameters. A dual target run made on polished GaAs targets resulted in a crystalline film, although of low Si composition. CdSiAs2 (211) and (112) peaks were identified in the X-ray spectrum. DOE

N81-23685# Los Alamos Scientific Lab., N. Mex.
PRELIMINARY ASSESSMENT OF THE IMPACT OF FLYWHEEL ENERGY STORAGE TECHNOLOGY ON TAXICAB FLEET OPERATION IN A LARGE METROPOLITAN CITY
Milton C. Krupka and Sydney V. Jackson Feb. 1981 61 p refs
(Contract W-7405-eng-36)
(LA-8722-MS) Avail: NTIS HC A04/MF A01

The incorporation of flywheel energy storage systems (FESS) into automotive vehicles for urban driving is discussed. A levelized life cycle cost comparison between a standard internal combustion engine vehicle (ICEV) in present use as a taxicab in New York City and a projected FESS/ICEV taxicab is generated. Potential energy savings and environmental benefits are discussed, and potential institutional barriers to FESS implementation are identified. The levelized life cycle cost comparison suggests that: FESS/ICEV costs are 3.3 percent/paid mile less than that of the ICEV: the capital costs represent a small fraction of the total and are less than fuel costs in both categories. An assumed 50% increase in fuel economy (miles/gallon) translates to a 33.3 percent savings in fuel purchase for the same annual accumulated mileage by New York City licensed taxicabs. For approximately 12,000 vehicles at $1.20/gallon, annual savings amount to approximately $30.00 x 10(6) (approximately 25 x 10(6) gallons). Environmental improvement in the form of reduction emissions is expected with the introduction of FESS/ICEV taxicabs. DOE

N81-23686# Oak Ridge National Lab., Tenn.
RESIDENTIAL ENERGY USE AND CONSERVATION ACTIONS: ANALYSIS OF DISAGGREGATE HOUSEHOLD DATA
Eric Hirst, Richard Goeltz, and Janet Carney Mar. 1981 70 p refs
(Contract W-7405-eng-26)
(ORNL/CON-68) Avail: NTIS HC A04/MF A01

The Energy Information Administration recently published data collected from the National Interim Energy Consumption Survey (NIECS). NIECS includes detailed information on 4081 individual households; demographic characteristics, energy related features of the structure, heating equipment and appliances, conservation actions taken by the household, and fuel consumption and cost for the April 1978 to March 1979 one year period. The NIECS data on household energy consumption - total energy use, electricity use, and use of the primary space heating fuel, are summarized and analyzed. The regression equations constructed explain roughly half the variation in energy use among households. These equations contain ten or fewer independent variables, the most important of which are fuel price, year house was built, floor area, and heating degree days. Regression equations were developed that estimate the energy saving achieved by each household based on their recent retrofit actions. DOE

N81-23687# Sandia Labs., Albuquerque, N. Mex. Geo Energy Systems Analysis Div.
PRELIMINARY ANALYSIS OF TWO ASPECTS OF MAGMA-POWERED ELECTRIC-GENERATION PLANTS
Eddie R. Hoover Sep. 1980 26 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-1522) Avail: NTIS HC A03/MF A01

Two aspects critical to the development of magma electric generation plants using closed heat exchanger systems are addressed. The heat transfer between the cold fluid in the downcomer and the hot fluid in the upcomer is analyzed using an NTU-effectiveness technique. The results indicate the hot fluid must be thermally insulated from the colder fluid in order to yield a useful temperature difference at the surface. A preliminary system analysis is conducted to determine the well cost requirements of an economically competitive magma electric plant. There is no economic incentive to make the magma tap wellbore larger than conventional deep gas wells. The cost competitiveness of a magma/electric plant is influenced by the depth to the magma, the convective heat flux of the magma, and the expected life of each well. DOE

N81-23688# Department of Energy, Washington, D. C. Assistant Secretary for Environment.

COMPARING ENERGY TECHNOLOGY ALTERNATIVES FROM AN ENVIRONMENTAL PERSPECTIVE

P. W. House, J. A. Coleman, R. D. Shull, R. W. Matheny, and J. C. Hock Feb. 1981 73 p refs

(DOE/EV-0109) Avail: NTIS HC A04/MF A01

A number of individuals and organizations advocate the use of comparative, formal analysis to determine which are the safest methods for producing and using energy. An opposing viewpoint is presented, arguing that for technical reasons, analysis can provide no definitive or rationally credible answers to the question of overall safety. Analysis has not and cannot determine the sum total of damage to human welfare and ecological communities from energy technologies. Analysis has produced estimates of particular types of damage; however, it is impossible to make such estimates comparable and commensurate across different classes of technologies and environmental effects. As a result of the deficiencies, comparative analysis cannot form the basis of a credible, viable energy policy. Yet, without formal comparative analysis, how can health, safety, and the natural environment be protected. A method is proposed for improving the Nation's approach to this problem: health and the environment should be considered as constraints on the deployment of energy technologies, constraints that are embodied in Government regulations. DOE

N81-23689# Midwest Research Inst., Golden, Colo.

SOLAR THERMAL ELECTRIC POWER INFORMATION USER STUDY

W. W. Belew, B. L. Wood, T. L. Marle, and C. L. Reinhardt Feb. 1981 194 p refs

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(SERI/TR-751-750) Avail: NTIS HC A09/MF A01

The results of a series of telephone interviews with groups of users of information on solar thermal electric power are described. These results identified types of information each group needed and the best ways to get information to each group. In the current study only high priority groups were examined. Results from five solar thermal electric power groups of respondents are analyzed: DOE Funded Researchers; Non-DOE-Funded Researchers; Representatives of Utilities; Electric Power Engineers; and Educators. DOE

N81-23690# Midwest Research Inst., Golden, Colo.

BIOMASS ENERGY SYSTEMS INFORMATION USER STUDY

W. W. Belew, B. L. Wood, T. L. Marle, and C. L. Reinhardt Feb. 1981 277 p

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(SERI/TR-751-748) Avail: NTIS HC A13/MF A01

A series of telephone interviews with groups of users of information on biomass energy systems are described. These results, part of a larger study on many different solar technologies, identify types of information each group needed and the best ways to get information to each group. Results from 13 biomass groups of respondents are analyzed in this report: Federally Funded Researchers (2 groups); Nonfederally Funded Researchers (2 groups); Representatives of Manufacturers (2 groups); Representatives of State Forestry Offices; Private Foresters; Forest Products Engineers; Educators; Cooperative Extension Service County Agents; and System Managers. DOE

N81-23691# Midwest Research Inst., Golden, Colo.

ACTIVE SOLAR HEATING AND COOLING INFORMATION USER STUDY

W. W. Belew, B. L. Wood, T. L. Marle, and C. L. Reinhardt Jan. 1981 421 p refs

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(SERI/TR-751-747) Avail: NTIS HC A18/MF A01

The results of a series of telephone interviews with groups of users of information on active solar heating and cooling (SHAC) are presented. In the current study only high-priority groups were examined. Results from 19 SHAC groups respondents are analyzed in this report: DOE-Funded Researchers; Non-DOE-Funded Researchers, Representatives of Manufactures (4 groups); Distributors; Installers; Architects; Educators, Cooperative Extension Service County Agents; Building Owners/Managers, and Homeowners (2 groups). DOE

N81-23692# Argonne National Lab., Ill. Energy and Environmental Systems Div.

PRELIMINARY ASSESSMENT OF THE SATELLITE POWER SYSTEM (SPS) AND SIX OTHER ENERGY TECHNOLOGIES

T. Wolsko, C. Brown, R. Cirillo, J. R. Gasper, L. J. Habegger, K. Hub, E. Levine, D. Newsom, M. Samsa, and E. Tanzman Apr. 1980 188 p refs

(Contract W-31-109-eng-38)

(ANL/AA-20) Avail: NTIS HC A09/MF A01

Six alternative technologies (conventional coal combustion; light water reactor; coal gasification/combined cycle; liquid metal, fast breeder reactor; terrestrial photovoltaic; and fusion) were compared to the SPS on the basis of available data on cost and performance, health and safety, environmental welfare, resource requirements, and economics. These comparisons are descriptive and do not culminate in any bottom line regarding the overall viability of the SPS. DOE

N81-23693# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

BLOCK 5 SOLAR CELL MODULE: DESIGN AND TEST SPECIFICATION FOR INTERMEDIATE-LOAD APPLICATIONS, 1981

20 Feb. 1981 38 p

(Contract DE-AI01-76CS-31037)

(DOE/CS-31037/T1) Avail: NTIS HC A03/MF A01

Intermediate load modules generally having the following design features and characteristics: nominal operating voltage (V sub no) between 5 Vdc and 20 Vdc; ability to be series connected to worst case open circuit voltages of 1000 Vdc; dimensions not exceeding 1.22 m x 2.44 m; flat-plate configurations (non-concentrating); and output power referenced to nominal operating conditions and V sub no. In addition to module design and performance requirements, a series of characterization and qualification tests are also specified. DOE

N81-23694# General Electric Co., Schenectady, N. Y. Energy Systems Progress Dept.

FUEL CELL POWER PLANT INTEGRATED SYSTEMS EVALUATION Final Report

T. L. Bonds, M. H. Dawes, A. W. Schnacke, and L. W. Spradlin Jan. 1981 261 p Sponsored by Electric Power Research Inst.

(EPRI Proj. 1085-1)

(EPRI-EM-1670) Avail: NTIS HC A12/MF A01

Power plant configurations for a central station (675 MW) fueled by coal and small dispersed plan generation plants fueled by oil were defined. Capital costs and costs for electricity were evaluated for both plants. Parametric variations and the impact on plants and components are discussed. Alternate oil fueled oil fired cycles as well as several alternate coal gasifiers were examined to show effects on plant performance. The economic attractiveness of the coal fired plant was confirmed and a scenario is established for an oil fired plant with reject heat recovery. Performance for the coal fired plant exceeds the study goal of 6800 Btu/kWh. The oil fired plant performance of 7627 Btu/kWh is very close to the study goal of 7500 Btu/kWh. The development of a finite slice computer model of the carbonate fuel cell is reported and an initial parametric cell and plant performance study was performed using the model. Preliminary subsystem description sheets and plant layout arrangements are presented. DOE

N81-23695# California Univ., Berkeley. Energy and Environment Div.

REGIONAL COMPARISONS OF ON-SITE SOLAR POTENTIAL IN THE RESIDENTIAL AND INDUSTRIAL SECTORS

Allan E. Gatzke and Amy O. Skewes-Cox Oct. 1980 155 p refs

(Contract W-7405-eng-48)

(LBL-11789) Avail: NTIS HC A08/MF A01

Regional and subregional differences in the potential development of decentralized solar technologies are studied. Two sectors of the economy were selected for intensive analysis: the residential and industrial sectors. The sequence of analysis follows

the same general steps: (1) selection of appropriate prototypes within each land use sector disaggregated by census region; (2) characterization of the end-use energy demand of each prototype in order to match an appropriate decentralized solar technology to the energy demand; (3) assessment of the energy conservation potential within each prototype limited by land use patterns, technology efficiency, and variation in solar insolation; and (4) evaluation of the regional and subregional differences in the land use implications of decentralized energy supply technologies that result from the combination of energy demand, energy supply potential, and the subsequent addition of increasingly more restrictive policies to increase the percent contribution of on-site solar energy. DOE

N81-23696# Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.

PERFORMANCE MONITORING OF GROUND-COUPLED SOLAR-ASSISTED HEAT PUMP SYSTEMS Interim Report

J. D. Parker and B. Frierson Feb. 1981 37 p Prepared for Electric Power Research Inst. Prepared in cooperation with Oklahoma Gas and Electric Co., Oklahoma City

(EPRI Proj. 1191-6)

(EPRI-EM-1697) Avail: NTIS HC A03/MF A01

Three Oklahoma Gas and Electric Company demonstration houses in Perkins, Oklahoma, and the data acquisition systems are described. The project involves comparison of the performance of a ground-coupled, solar-assisted heat pump system with that of a ground coupled heat pump system without solar assist, and with a conventional air source heat pump system. Details of the data acquisition and processing system are given. Problems encountered and anticipated are discussed. DOE

N81-23697# Oak Ridge Y-12 Plant, Tenn. Fabrication Systems Dept.

ROCKWELL-ROCKETDYNE FLYWHELL TEST RESULTS

R. S. Steele, Jr., E. F. Babelay, Jr., and B. J. Sutton Jan. 1981 49 p

(Contract W-7405-eng-26)

(Y/DX-244) Avail: NTIS HC A03/MF A01

Results are presented of the spin test evaluation of the Rockwell-Rocketdyne RPE-10 design flywheel at the Oak Ridge Flywheel Evaluation Laboratory. Details of the static evaluation, including measures of weight, inertia, natural frequencies, and radiography, are also presented. The flywheel was subjected to seven spin cycles with a maximum of 383 rps, 105% of design speed. At that speed, the energy stored was 1.94 kWhr at 36.1 Whr/kg. The maximum speed was limited by the inability of the test facility to accommodate the increasing eccentric shift of both hub disks with increasing speed. No material degradation was observed during the testing. DOE

N81-23698# Harvard Univ., Cambridge, Mass. Energy and Environment Policy Center.

ASSESSMENT OF THE SOLAR HEATING AND COOLING IN RESIDENTIAL BUILDING DEMONSTRATION PROGRAM Interim and Final Report

D. Craig Wolff Aug. 1980 21 p refs

(Contract DE-AC01-80PE-70278)

(DOE/PE-70278/T10) Avail: NTIS HC A02/MF A01

The Solar Heating and Cooling in Residential Building Demonstration of 1974 is assessed. The program's goals and the Government Accounting Office's (GAO) evaluation of the program's success are stated. The program is analyzed with regard to objectives, results, data, and the GAO's conclusions. The differing approaches of the GAO and the Department of Housing and Urban Development to the program are analyzed and compared, showing weaknesses in each. Conclusions on the relative success of the program are drawn, and recommendations are made regarding any future programs of this type. DOE

N81-23699# Argonne National Lab., Ill. Energy and Environment Systems Div.

DISTRICT HEATING FROM ELECTRIC-GENERATING PLANTS AND MUNICIPAL INCINERATORS: LOCAL PLANNERS ASSESSMENT GUIDE

W. Pferdehirt and N. Kron, Jr. Nov. 1980 117 p refs

(Contract W-31-109-eng-38)

(ANL/CNSV-12) Avail: NTIS HC A06/MF A01

The preliminary evaluation of the feasibility of district heating using heat recovered from electric generating plants and municipal incinerators is outlined. System feasibility is indicated by: (1) the existence of an adequate supply of nearby waste heat,(2) the presence of a sufficiently dense and large thermal load, and (3) a favorable cost comparison with conventional heating methods. DOE

N81-23700# Department of Energy, Washington, D. C. Office of Nuclear Reactor Programs.

US CENTRAL STATION NUCLEAR ELECTRIC GENERATING UNITS: SIGNIFICANT MILESTONES, STATUS AS OF OCTOBER 1, 1980

Dec. 1980 43 p

(DOE/NE-0030/4(80)) Avail: NTIS HC A03/MF A01

Lists of the nuclear power units according to state, region, and utility are presented. A tabulation of status, schedules, and orders is also included. DOE

N81-23701# Los Alamos Scientific Lab., N. Mex.

REVIEW OF THE GEOTHERMAL RESERVOIR WELL STIMULATION PROGRAM

Donald A. Campbell (Republic Geothermal, Inc.), Robert J. Hanold, A. Richard Sinclair (Naurer Engineering, Inc.), and Otto J. Vetter (Vetter Research) 1981 20 p Presented at the Intern. Geothermal Drilling and Completions Technol. Conf., Albuquerque, N. Mex., 21 Jan. 1981

(Contract W-7405-eng-36)

(LA-UR-81-26; CONF-810105-3) Avail: NTIS HC A02/MF A01

The overall program and the four experimental fracture stimulation treatments completed to date are described. Two stimulation experiments were performed at the Raft River, Idaho, Known Geothermal Resource Area (KGRA) in late 1979. This is a naturally fractured, hard rock reservoir with a relatively low geothermal resource temperature (300 F). A conventional planar hydraulic fracture job was performed in Well RRGP-5 and a Kiel dendritic (or reverse flow) technique was utilized in Well RRGP-4. In mid-1980, two simulation experiments were performed at the East Mesa, California, KGRA. The stimulation of Well 58-30 provided the first geothermal well fracturing experience in a moderate temperature (350 F) reservoir with matrix type rock properties. The two treatments consisted of a conventional hydraulic fracture of a deep, low permeability zone and a minifrac Kiel treatment of a shallow, high permeability zone in the same well. DOE

N81-23702# Sandia Labs., Albuquerque, N. Mex.

SOLAR ENHANCED OIL RECOVERY: A POTENTIAL EARLY MARKET FOR INDUSTRIAL SOLAR ENERGY

Kenneth D. Bergeron and Virgil L. Dugan 1980 12 p refs Presented at the Natl. Conf. on Renewable Energy Technol., Honolulu, Hawaii, 7 Dec. 1980

(Contract DE-AC04-76DP-00789)

(SAND-80-1869C; CONF-801203-5) Avail: NTIS HC A02/MF A01

Enhanced oil recovery and the possibility of using solar energy to replace current methods are discussed. The market potential for solar enhanced oil recovery is explored. DOE

N81-23703# Massachusetts Inst. of Tech., Cambridge.

COMPARISON BETWEEN THE SIMPLE AND ENERGY MIXING MODELS

K. J. Burns and Neil E. Todreas Jul. 1980 75 p refs

(Contract DE-AS02-76ET-37240)

(DOE/ET-37240/78TR) Avail: NTIS HC A04/MF A01

The SIMPLE and ENERGY mixing models were compared in order to investigate the limitations of SIMPLE's analytically formulated mixing paramater, relative to the experimentlly calibrated ENERGY mixing parameters. For interior subchannels, it was shown that when the SIMPLE and ENERGY parameters are reduced to a common form, there is good agreement between the two models for typical fuel geometry. However, large discrepancies exist for typical blanket (lower P/D) geometries. Furthermore, the discrepancies between the mixing parameters result in significant differences in terms of the temperature profiles generated by the ENERGY code utilizing these mixing parameters as input. For edge subchannels, the assumptions made in

the development of the SIMPLE model were extended to the rectangualr edge subchannel geometry used in ENERGY. DOE

N81-23704# Arinc Research Corp., Annapolis, Md.
GUIDE FOR THE ASSESSMENT OF THE RELIABILITY OF GASIFICATION-COMBINED-CYCLE POWER PLANTS Interim Report
J. Blair, J. Witt, and M. Neely Nov. 1980 178 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1461)
(EPRI-AP-1610) Avail: NTIS HC A09/MF A01

The assessment methodology deals with the estimation of a GCC plant's inherent operating reliability. The concept of inherent operating reliability assumes the performance of normal scheduled maintenance but precludes the consideration of corrective maintenance. The proposed system metric is tau sub o (the time required for the GCC plant to reach a predefined level of output), which is analogues to a mean time to failure for the entire plant. The guide presents a seven step assessment methodology that uses the concepts of system states and state capability (the power output associated with each state) in conjunction with a matrix of state transition probabilities to produce a time varying estimate of GCC plant effectiveness. DOE

N81-23705# Sandia Labs., Albuquerque, N. Mex. Experimental Systems Operations Div.
THE COOLIDGE SOLAR IRRIGATION PROJECT Annual Report, 1980
Leroy Torkelson and Dennis L. Larson Feb. 1981 148 p Prepared in cooperation with Arizona Univ., Tucson
(Contract DE-AC04-76DP-00789)
(SAND-80-2378) Avail: NTIS HC A07/MF A01

The solar irrigation facility consists of a 2136.8 m(2) (23,000 ft(2)) line-focus parabolic trough collector subsystem, a 113.55 m(3) (30,000 gallon) thermal storage subsystem, and a 150 kW/sub e/ (142.2 Btu/s) organic Rankine cycle power generation unit. The performance of the facility and its operational and maintenance requirements are reported. The period from the facility's initial operation in October 1979 to 31 August 1980 is covered. DOE

N81-23706# Battelle Columbus Labs., Ohio. Electrochemical Technology Group.
ASSESSMENT OF NICKEL-HYDROGEN BATTERIES FOR TERRESTRIAL SOLAR APPLICATIONS Final Report
John E. Clifford and Eric W. Brooman Feb. 1981 88 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-7191) Avail: NTIS HC A05/MF A01

The development of the nickel hydrogen (Ni-H2) battery for aerospace applications was reviewed to determine the potential applicability to terrestrial photovoltaic energy storage. There are several desirable technical characteristics of Ni-H2 cells that were demonstrated with aerospace cell designs that are of interest for terrestrial applications and photovoltaic energy storage in particular: long cycle life (> 7000 cycles) which was demonstrated for aerospace cells of high depth of discharge of 80% of rated (theoretical) capacity at high rate of charge and discharge: the potential for long calendar life with minimal maintenance requirements; pressure indication of state of charge; and tolerance for overcharge, overdischarge, and operation at any state of charge. The relatively high rate of self discharge of aerospace Ni-H2 batteries might be minimized for terrestrial, stationary storage applications where weight and volume are less critical. The principal disadvantage is the high cost associated with present aerospace designs of the Ni-H2 battery. In view of the favorable technical performance, further study of the Ni-H2 battery for terrestrial photovoltaic applications is recommended to determine the extent to which cost can be reduced without sacrificing performance. DOE

N81-23707# Illinois Inst. of Tech., Chicago. Dept. of Chemical Engineering.
FLUIDIZATION USING NON-EQUILIBRIUM THERMODYNAMICS Annual Report, Jan. 1979 - Dec. 1980
Dimitri Gidaspow, Bozorg Ettehadieh, and Chungliang Lin Dec. 1980 76 p refs Sponsored by Gas Research Inst.
(PB81-153249; GRI-80/0014) Avail: NTIS HC A05/MF A01 CSCL 10A

A reasonable computer solution to transient two dimensional fluidization was obtained and compared with laboratory void fraction data. The first objective was to develop a hydrodynamic theory of fluidization using the entropy production principle and separate phase mass and momentum balances. The second objective was to compare various hydrodynamic theories of fluidization to themselves and to experimental evidence. It appears that eventually it may be possible to design fluidized bed reactors starting from first principles. GRA

N81-23708# General Electric Co., St. Petersburg, Fla.
MOLTEN CARBONATE FUEL CELL LARGE STACK DEVELOPMENT Final Report, May 1979 - Jun. 1980
Lawrence J. Degan Jun. 1980 202 p refs Sponsored by New York State Energy Research and Development Authority, Albany
(PB81-145930; NYSERDA-80-17) Avail: NTIS HC A10/MF A01 CSCL 10B

The fuel cell promised to be a very efficient and economically and environmentally attractive way to convert the energy contained in coal to electricity. The cell could be used for base load power generation. It could also be placed in urban settings to provide locally-needed power; to stabilize voltage transients; to minimize the need for additional electric transmission lines into cities and to provide co-generated heat. This project gave specific consideration to electrode development, stack configuration, New York State applications and the applicability of New York-made gasifiers. GRA

N81-23709# National Bureau of Standards, Washington, D.C. National Engineering Lab.
SOLAR ENERGY SYSTEMS: STANDARDS FOR COVER PLATES FOR FLAT PLATE SOLAR COLLECTORS Final Report
Elizabeth J. Clark, Willard E. Roberts, John W. Grimes, and Edward J. Embree Dec. 1980 161 p refs Sponsored in part by DOE, Washington, D.C.
(PB81-147290; NBS-TN-1132) Avail: NTIS HC A08/MF A01 CSCL 10A

Laboratory studies were performed to obtain data needed for the development of standards to evaluate the performance and durability of cover plates for flat plate solar collectors used in solar heating and cooling systems. Ten cover plate materials were evaluated to assess their durability after exposure to heat aging, natural weathering, and accelerated weathering. Laboratory tests included measurement of solar energy transmittance, linear dimensional stability, warpage and the effect of the dirt retention. The temperatures cover plate materials attain on solar collectors were determined by measurement and by computer simulations. A procedure was developed for the natural weathering exposure of cover plate materials at elevated temperatures which approximate stagnation conditions of solar collectors. The results of the laboratory tests are presented and draft standards for evaluating cover plate materials for flat plate solar collectors are proposed. GRA

N81-24017*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Engineering Sect.
COMPUTER SIMULATED BUILDING ENERGY CONSUMPTION FOR VERIFICATION OF ENERGY CONSERVATION MEASURES IN NETWORK FACILITIES
B. Plankey *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 142-146 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 10B

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N81-23710 University of South Florida, Tampa.
PRECONCENTRATION METHODS FOR THE DETERMINATION OF GASEOUS SULFUR COMPOUNDS IN AIR Ph.D. Thesis

James Michael Ammons 1980 294 p
Avail: Univ. Microfilms Order No. 8108254

The use of a gold surface was investigated for use as a preconcentration medium in the determination of gaseous sulfur compounds. Reduced sulfur compounds and SO2 are adsorbed out of ambient air onto the gold surface. Both gold coated sand and gold foil, contained in a quartz tube, were used as sorbents. Recovery and determination of adsorbed sulfur compounds is accomplished in a two step process. In step one, the surface is treated with vapors of ethyl iodide and the sulfur compounds are desorbed from the surfaces by heating the sorption tubes to 400 C with a nitrogen carrier gas. Desorbed compounds are trapped in a short liquid nitrogen cooled chromatography column. The ethyl iodide converts H2S, COS, and CS2 to diethyl sulfide and stabilizes mercaptans by converting them to their ethyl derivatives. Separators and detection is via temperature programmed Gas Chromatography/Flame Photometry (GC/FPD) technique. In step two, the preconcentration tubes are treated with H2 at 500 to remove residual sulfate and to prepare the surface for subsequent sampling. Dissert. Abstr.

N81-23711# Comptroller General of the United States, Washington, D.C.
FEDERAL-STATE ENVIRONMENTAL PROGRAMS: THE STATE PERSPECTIVE Report to the Congress of the United States
22 Aug. 1980 105 p
(CED-80-106) Avail: NTIS HC A06/MF A01

In the 1970's the Federal Government increasingly relied on the States to carry out federally mandated environmental programs, and most States have assumed that responsibility. However, the States believe many obstacles impede their implementation of those programs. Because of the obstacles and the States' perception that they were ignored by Federal decision makers, the partnership envisioned by Congress between the EPA and the States has not materialized. Recommendations are presented to strengthen the EPA-State partnership. T.M.

N81-23712*# Bionetics Corp., Hampton, Va.
CUMULATIVE ANNOYANCE DUE TO MULTIPLE AIRCRAFT FLYOVER WITH DIFFERING PEAK NOISE LEVELS
Kevin P. Shepherd Washington May 1981 30 p refs
(Contract NAS1-14970)
(NASA-CR-3417) Avail: NTIS HC A03/MF A01 CSCL 13B

A laboratory study in which 160 subjects judged the annoyance of 30 minute sessions of aircraft noise is described. Each session contained nine flyovers consisting of various combinations of three takeoff recordings of Boeing 727. The subjects were asked to judge their annoyance in the simulated living room environment of the laboratory and also to assess how annoyed they would be if they heard the noise in their home during the day, evening, and night periods. The standard deviation of the sound level did not improve the predictive ability of L sub eq (equivalent continuous sound level) which performed as well or better than other noise measured. Differences were found between the projected home responses for the day, evening, and nighttime periods. Time of day penalties derived from these results showed reasonable agreement with those currently used in community noise indices. Author

N81-23713*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN AIRPORT COMMUNITY NOISE-IMPACT ASSESSMENT MODEL
Richard DeLoach Jul. 1980 21 p refs Presented at the 98th Acoust. Soc. of Am. Meeting, Salt Lake City, Utah, 26-30 Nov. 1979
(NASA-TM-80198) Avail: NTIS HC A02/MF A01 CSCL 13B

A computer model was developed to assess the noise impact of an airport on the community which it serves. Assessments are made using the Fractional Impact Method by which a single number describes the community aircraft noise environment in terms of exposed population and multiple event noise level. The model is comprised of three elements: a conventional noise footprint model, a site specific population distribution model, and a dose response transfer function. The footprint model provides the noise distribution for a given aircraft operating scenario. This is combined with the site specific population distribution obtained from a national census data base to yield the number of residents exposed to a given level of noise. The dose response relationship relates noise exposure levels to the percentage of individuals highly annoyed by those levels. Author

N81-23714# California Univ., Irvine. Sanitary Engineering Research Lab.
ENVIRONMENTAL QUALITY RESEARCH FISH AND AUFWUCHS BIOASSAY Annual Report, 1 Jun. 1979 - 31 May 1980
Stephen A. Klein and David Jenkins Jan. 1981 95 p refs
(Contract F33615-76-C-5005; AF Proj. 6302)
(AD-A097080; AFAMRL-TR-80-102; TR-5) Avail: NTIS HC A05/MF A01 CSCL 06/6

This report contains the results of research efforts of a project concerned with defining the effects of potential environmental contamination resulting from the use of certain Air Force materials on fresh water and saline water fish and attached periphyton (aufwuchs). Materials being evaluated include JP-4, JP-8, and shale JP-8. Techniques for exposing organisms to these substances are discussed and results of such exposures are presented. Author (GRA)

N81-23715# Naval Postgraduate School, Monterey, Calif.
INITIAL VALIDATION OF AN AMBIENT AIR QUALITY MODEL FOR NAVAL AIR OPERATIONS Final Report
T. S. Douglas and D. W. Netzer Dec. 1980 134 p refs
(Contract N62376-79-WR-00014)
(AD-A097665; NPS67-81-002) Avail: NTIS HC A07/MF A01 CSCL 13/2

A previously developed model was updated to appropriately represent 1978/79 operations and then evaluated for prediction sensitivity to variations in meteorological and dispersion model parameters. A joint effort with the Naval Air Propulsion Center, the Environmental Protection Agency/Northrup Services, Inc. and PMTC, Pt. Mugu was conducted to obtain detailed data over a one-week period. Much of the measured pollution concentration data (including all of the suspended particulate data) was lost due to instrument and measurement technique problems. This severely limited the validation effort. Comparison of model predictions with the limited initial measured concentration data indicated that: (1) predicted CO concentrations were in good agreement with measurement, (2) predicted NOX concentrations from aircraft idle/taxi operations were too low, and (3) predicted total hydrocarbons and particulate concentrations were too high for aircraft idle/taxi operations and too low for environ sources. Model predictions were significantly improved by increasing engine RPM settings to above idle for all modes normally specified as idle. Model validation efforts would be improved if one-half integer stability categories could be measured and used in the model. Author (GRA)

N81-23716# Kentucky Univ., Lexington. Dept. of Chemical Engineering.
HOT-GAS DESULFURIZATION. 1: USE OF GASIFIER ASH IN A FIXED-BED PROCESS Final Report
J. Thomas Schrodt 1 Apr. 1980 262 p
(Contracts DE-AS05-76ET-10463; E(40-1)-5076; EY-76-S-05-5076)
(DOE/ET-10463/T1-Vol-1) Avail: NTIS HC A12/MF A01

A method for removing gaseous sulfur compounds from coal derived fuel gases through their reaction with the iron in gasifier coal ash was thoroughly researched, and the results applied for design of a commercial scale, fixed bed, desulfurization process. Ashes with 5-23 weight percent iron oxide were used in small reactors to sorb hydrogen sulfide from synthesized low Btu fuel gas. Carbonyl sulfide and carbon disulfide are also removed indirectly after hydrogenation to hydrogen sulfide. A mixture of sulfur dioxide and sulfur is recovered during regeneration of spent ashes. DOE

N81-23717# Sandia Labs., Albuquerque, N. Mex. Environmental Research Div.
LAGRANGIAN MEASUREMENT PLATFORM FLIGHTS IN SUPPORT OF THE TENNESSEE PLUME STUDY: FIELD EFFORT AND DATA
G T. Gay, B. D. Zak, B. Barker (Denver Univ.), R. M. Holland, Jr.

(AnaChem Inc., Albuquerque), and P. S. Homann (AnaChem, Inc., Albuquerque) Mar. 1981 180 p refs
(Contract DE-AC04-76DP-00789)
(SAND-79-1336) Avail: NTIS HC A09/MF A01

During the month of August 1978, two Lagrangian measurement platform (LAMP) experiments were conducted in conjunction with the Environmental Protection Agency's Tennessee Plume Study. In both experiments, the LAMP was launched into the Cumberland Power Plant plume. The instrumental balloon system provided data on the chemical and physical behavior of the pollutants downwind from the plant over the duration of the flights. A description of the field effort, the data acquired, and some preliminary results are presented. T.M.

N81-23718# Lovelace Biomedical and Environmental Research Inst., Albuquerque, N. Mex. Inhalation Toxicology Research Inst.

FLUIDIZED-BED COMBUSTION EMISSIONS: TOXICOLOGY PROGRAM

Charles H. Hobbs, ed. and R. L. Carpenter, ed. Jul. 1980 43 p refs
(Contract DE-AC04-76EV-01013)
(LMF-83) Avail: NTIS HC A03/MF A01

Information available as of July 1980 is presented. Special emphasis was given to comparisons between the AFBC information available to date and information available from the conventional combustion of coal, even though these comparisons are between an experimental scale unit on one hand and full sized units on the other. Major findings and conclusions are summarized. DOE

N81-23719# Lovelace Biomedical and Environmental Research Inst., Albuquerque, N. Mex.

DIESEL-EXHAUST EMISSIONS-TOXICOLOGY PROGRAM

Roger O. McClellan, ed. Jul. 1980 63 p refs
(Contract DE-AC04-76EV-01013)
(LMF-81) Avail: NTIS HC A04/MF A01

The current status of research programs to assess the potential health impacts of increased use of diesel engines is reported. The research consists of activities in five interrelated areas: (1) studies to establish the physical, chemical and biological characteristics of emissions from different vehicles over a range of operating conditions, fuel types and control devices; (2) evaluations to predict the transport and transformation of diesel exhaust as it moves from vehicles to the breathing zone of man; (3) research to predict the inhalation, deposition, retention and fate in the body of diesel exhaust particles and the organic compounds that are an integral part of the particles; (4) chronic exposure of laboratory animals to graded levels of diesel exhaust to determine the potential of these exposures for causing cancer or functional disorders, especially the respiratory tract, over the lifetime of the animals; and (5) development of an integrated risk assessment that brings together all relevant information to predict (a) emissions, (b) exposure atmospheres, (c) effective dose to critical tissues, and (d) health effects in man for various scenarios of diesel vehicle production and deployment. DOE

N81-23720# Oak Ridge National Lab., Tenn. Environmental Sciences Div.

ENVIRONMENTAL ISSUES AND SITE SELECTION CRITERIA FOR SMALL HYDROPOWER PROJECTS IN DEVELOPING COUNTRIES

Glenn F. Cada and Frank Zadroga (National Univ., Heredia, Costa Rica) Mar. 1981 55 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7620; Publ-1712) Avail: NTIS HC A04/MF A01

The feasibility study is the final stage of site selection, where a relatively small number of candidate Small Hydropower Projects (SHPP) sites are examined in greater detail and the best are selected for development. Potential environmental impacts of SHPP's are discussed, and a checklist of environmental data that should be collected in order to judge the significance of the projected impacts is provided. Recommendations are made as to the necessary training and capabilities of the personnel involved in the site selection studies and the general procedures by which the studies may be conducted. DOE

N81-23721# Department of Energy, Washington, D. C. Div. of Geothermal Energy.

GEOTHERMAL ENERGY GEOPRESSURE SUBPROGRAM

Feb. 1981 203 p refs
(DOE/EA-0134) Avail: NTIS HC A10/MF A01

Drilling one geopressured-geothermal resource fluid well for intermittent production testing is discussed. It is felt that the total fluid production will approximate 50 million barrels. The test well will be drilled with a 22 cm (8.75 in.) borehole to a total depth of approximately 5185 (17,000 ft). Up to four disposal wells will provide disposal of the fluid. The following are included in this assessment: the existing environment; probable environmental impacts direct and indirect; probable cumulative and long term environmental impacts; accidents; coordination with federal, state, regional, and local agencies; and alternative actions. DOE

N81-23722# Argonne National Lab., Ill. Energy and Environmental Systems Div.

ENVIRONMENTAL ASSESSMENT OF THE US DEPARTMENT OF ENERGY ELECTRIC AND HYBRID VEHICLE PROGRAM

M. K. Singh, M. J. Bernard, III, W. B. Walsh, R. F. Giese, J. R. Gasper, C. L. Saricks, L. G. Hill, S. K. Zelinger, D. J. Lutenegger, and R. Zolomij Nov. 1980 526 p refs Prepared in cooperation with Barton-Aschman Associates, Chicago and Mittelhauser Corp., Downers Grove, Ill.
(Contract W-31-109-eng-38)
(ANL/CNSV-13) Avail: NTIS HC A23/MF A01

This environmental assessment (EA) focuses on the long term (1985-2000) impacts of the US Department of Energy (DOE) electric and hybrid vehicle (EHV) program. The goal of the program is the commercialization of: (1) electric vehicles (EVs) acceptable to broad segments of the personal and commercial vehicle markets; (2) hybrid vehicles (HVs) with range capbilities comparable to those of conventional vehicles (CVs); and (3) advanced EHVs completely with CVs with respect to both cost and performance. Five major EHV projects were established by DOE: market demonstration; vehicle evaluation and improvement; electric vehicle commercialization; hybrid vehicle commercialization; and advanced vehicle development. Conclusions are made as to the effects of EV and HV commercialization on that consumption and importation of raw materials; petroleum and total energy consumption; ecosystems impact from the time of obtaining raw material through vehicle use and materials recycling; environmental impacts on air and water quality, land use, and noise; health and safety aspects; and socioeconomic factors. DOE

N81-23723# Ames Lab., Iowa. Chemical Engineering Dept.

RECOVERY AND SEPARATION OF PRODUCTS FROM THE HIGH-TEMPERATURE CHLORINATION OF FLY ASH M.S. Thesis

Stuart Jeffry Weiss Feb. 1981 73 p refs
(Contract W-7405-eng-82)
(IS-T-947) Avail: NTIS HC A04/MF A01

Current information on aluminous chlorination processes, products and separation technology are analyzed. Two applicable separation schemes (anhydrous separation process, and aqueous separation process for alumina recovery) are proposed and discussed. From the standpoint of certainty of success alone, it is judged that the aqueous system is the superior process for alumina recovery. However, the aqueous process, while more conventional than the proposed anhydrous process, may consume more energy than the latter, since evaporation and thermal decomposition of hydrated products is incorporated in the former. In addition, chlorine, readily recoverable from anhydrous products, is virtually forfeited in the aqueous process. The proposed anhydrous process, while incorporating some untested process steps, requires fewer process steps, allows for chlorine recovery, and may require less energy. In addition, the anhydrous AlCl3 produced by this process can be used directly in a reduction cell which requires significantly less energy than a conventional Hall cell. DOE

N81-23724# Ames Lab., Iowa.

CHLORINATION OF FLY ASH AND BENTONITE WITH A GAS MIXTURE OF SILICON TETRACHLORIDE AND

CHRLORINE M.S. Thesis
P. C. Yuan Feb. 1981 76 p refs
(Contract W-7405-eng-82)
(IS-T-920) Avail: NTIS HC A05/MF A01

The aluminum removed from power plant fly ash by high temperature chlorination in the presence of silicon tetrachloride is examined. The degree to which silicon tetrachloride in the chlorinating gas stream suppresses chlorination of silicon dioxide without affecting the chlorination of alumina is studied. Higher partial pressure of silicon tetrachloride and higher reaction temperatures suppressed chlorination of silicon dioxide. When there was not sufficient carbon present to combine with all the oxygen, silicon tetrachloride suppressed chlorination of silicon dioxide to a greater degree. DOE

N81-23725# Battelle Pacific Northwest Labs., Richland, Wash.
EXPLORATORY BENEFIT-COST ANALYSIS OF ENVIRONMENTAL CONTROLS ON HYDROTHERMAL ENERGY
M. J. Scott, K. D. Wells, J. W. Currie, and M. J. King Feb. 1981 113 p refs
(Contract DE-AC06-76RL-01830)
(PNL-3527) Avail: NTIS HC A06/MF A01

Primary objectives were to evaluate the environmental damages caused by unregulated hydrothermal resource development, use existing environmental and economic data to estimate the dollar value of preventing expected environmental damages at two sites, and compare the benefits and costs of preventing the damages. The sites chosen for analyses were in the Imperial Valley at Heber and Niland, California. There is a high level of commercial interest in developing the Heber known geothermal resource area (KGRA) and the Salton Sea KGRA. The primary impacts analyzed were those related to hydrogen sulfide (H2S) emissions and those related to disposal of spent hydrothermal brine. DOE

N81-23726# California Univ., Berkeley. Engineering and Technical Services Div.
SENSITIVITY AND RESPONSE TIME IMPROVEMENTS IN MILLIMETER-WAVE SPECTROMETERS
W. F. Kolbe and B. Leskovar Sep. 1980 18 p refs
(Contract W-7405-eng-48)
(LBL-8789) Avail: NTIS HC A02/MF A01

A new version of a microwave spectrometer for the detection of gaseous pollutants and other atmospheric constituents is described. The spectrometer, which operates in the vicinity of 70 GHz, employs a Fabry-Perot resonator as a sample cell and uses superheterodyne detection for high sensitivity. The spectrome ter was modified to incorporate a frequency doubler modulated at 30 MHz to permit operation with a single Gunn oscillator source. As a result, faster response time and somewhat greater sensitivity are obtained. The spectrometer is capable of detecting a minimum concentration of 1 ppM of SO2 diluted in air with a 1 second time constant. For OCS diluted in air, the minimum detectable concentration is 800 ppB and with a 10 second time constant 300 ppB. DOE

N81-23727# Oak Ridge National Lab., Tenn. Information Div.
US DEPARTMENT OF ENERGY ENVIRONMENTAL COMPLIANCE PROGRAM HANDBOOK: FEDERAL REGULATIONS ON AIR QUALITY, FOSSILE ENERGY
Joy Huffstetler, Bobbie Neal Collier, Kathy Brown (Tennessee Univ.), and Nelda McAfee (Tennessee Univ.) Feb. 1981 193 p
(Contract W-7405-eng-26)
(ORNL/EIS-176) Avail: NTIS HC A09/MF A01

Federal laws and regulations on management of air quality that could affect the siting, construction, or operation of a fossil energy facility are identified. All entries are part of a computerized data base. Data summary sheets are presented. DOE

N81-23728# Georgia Univ., Athens. Inst. of Ecology.
FLUX OF ENERGY AND ESSENTIAL ELEMENTS THROUGH THE CONTINENTAL SHELF ECOSYSTEM Progress Report, 31 May 1980 - 31 May 1981
L. R. Pomeroy 1 Feb. 1981 80 p refs
(Contract DE-AS09-76EV-00639)
(DOE/EV-00639/22) Avail: NTIS HC A05/MF A01

There are three distinct areas of research reported, studies of intrusions of the west wall of the Gulf Stream onto the outer continental shelf, studies of the flux of materials across near-shore density fronts, and advances in the understanding of the planktonic food web of the continental shelf. Studies of frontal events on the outer and inner continental shelf involve distinctive physical and chemical regimes and have proven to required distinctive biological approaches. A simulation model of the flux of energy through the continental shelf food web was developed. It represents realistically both details of the energy transfers within the plankton community and the termanal production of fishes. It was discovered that the fecal ribbons of pelagic tunicates break up into flocculent material visually and chemically identical with the flocculent organic aggregates present in sea water. DOE

N81-23729# Research Triangle Inst., Research Triangle Park, N. C.
ASBESTOS ANALYTICAL PROGRAMS BULK SAMPLE ANALYSIS: NEW YORK CITY AND MARYLAND
A. V. Rao, Corette Parker, Deborah Whitehurst, Don Lentzen, Ty Hartwell, and Joseph J. Breen (EPA, Research Triangle Park) Sep. 1980 41 p refs
(Contract EPA-68-01-5848)
(PB81-146722; EPA-560/13-80-21) Avail: NTIS HC A03/MF A01 CSCL 13B

The bulk samples were analyzed for asbestos by various laboritories and the results given to the Research Triangle Institute for analysis. In particular, analysis of the New York City data which reported the presence or asbestos (Amosite or Chrysotile) in 474 bulk samples taken from various types of building material in New York City schools is described. The analysis of the Maryland data which contains analysis of 37 split-asbestos bulk samples taken from Maryland public schools is described. GRA

N81-23730# SRI International Corp., Menlo Park, Calif.
ASSESSING THE REPRESENTATIVENESS OF OZONE MONITORING DATA Final Report
F. L. Ludwig and Eugene Shelar Jan. 1980 75 p refs
(Contract EPA-68-02-2548; SRI Proj. 7863)
(PB81-146995; EPA-450/4-80-001) Avail: NTIS HC A04/MF A01 CSCL 13B

Areas within which the National Ambient Air Quality Standard (NAAQS) for ozone is likely to have been exceeded are shown to be related to the observed annual second-maximum ozone concentrations. Meteorological situations and seasons during which high ozone concentrations are most likely in various parts of the country are described, so that special monitoring studies can be designed to supplement existing data. An aircraft monitoring protocol is given that will provide observations that are representative of ground-level conditions. Conditions that cause ozone data to be unrepresentative are described as are uncertainties associated with instrumental and calibration factors. GRA

N81-23731# Midwest Research Inst., Kansas City, Mo.
MEASUREMENT OF ASBESTOS AIR POLLUTION INSIDE BUILDINGS SPRAYED WITH ASBESTOS
P. Sebastien, M. A. Billion-Gallard, G. Dufour, and J. Bignon Aug. 1980 75 p refs Transl. into ENGLISH of Rept. Direc. des Affaires Sanit. et Sociales de Paris, Paris, and Paris-Val de Marne Univ., Creteil, France Sponsored by the French Ministry of Health and the French Ministry for the Quality of Life-Environment
(Contract EPA-68-01-5915)
(PB81-147001; EPA-560/13-80-026) Avail: NTIS HC A04/MF A01 CSCL 13B

The measurement and assessment of airborne asbestos levels in buildings throughout Paris was studied. The methods of air sampling and transmission electron microscopic analysis, as well as a discussion of the results, are presented. Also included are extensive tables and figures summarizing the data collected. GRA

N81-23732# National Oceanic and Atmospheric Administration, Silver Spring, Md. Air Resources Lab.
NOAA METEOROLOGY LABORATORY SUPPORT TO THE ENVIRONMENTAL PROTECTION AGENCY Summary Report, FY 1979

Herbert J. Viebrock, ed. Jul. 1980 55 p refs Prepared in cooperation with Environmental Protection Agency, Research Triangle Park, N.C.
(PB81-149072; NOAA-TM-ERL-ARL-88; NOAA-80110704) Avail: NTIS HC A04/MF A01 CSCL 13B

Basic operation support consisted of the application of dispersion models and the conduct of dispersion studies and evaluations. Development and evaluation of air quality simulation models was carried out using numerical and physical techniques supported by field studies. Work on the description and modeling of the planetary boundary layer continued. Major emphasis was on modeling photochemical oxidant dispersion and dispersion in complex terrain. In addition, climatic studies were conducted, including the analyses of the relationships between pollutant concentrations and meteorological parameters. A first generation ozone forecasting technique was developed. GRA

N81-23733# Environmental Monitoring and Support Lab., Las Vegas, Nev.
FOUR CORNERS AIR MONITORING
M. J. Pearson, M. Pitchford, and R. N. Snelling Nov. 1980 105 p refs
(PB81-144156; EPA-600/4-80-053) Avail: NTIS HC A06/MF A01 CSCL 13B

Data are reported on mean seasonal total suspended particulates (TSP), sulfates, nitrates and elemental concentrations collected by a 28-station, high volume sampler network operated over a 3-year period in the Four Corners area of Arizona, New Mexico, Utah and Colorado. Estimates of data quality are based on results of an external quality assurance audit program. TSP values generally range from 10 to 50 micrograms per cubic meter and the sulfate/nitrate concentrations are generally less than 3 micrograms per cubic meter. GRA

N81-23734# Denver Research Inst., Colo.
SYMPOSIUM ON THE TRANSFER AND UTILIZATION OF PARTICULATE CONTROL TECHNOLOGY. VOLUME 3: PARTICULATE CONTROL DEVICES Progress Report, Jun. 1979 - Jun. 1980
F. P. Venditti, J. A. Armstrong, and Michael Durham Sep. 1980 549 p refs Conf. held at Denver, 23-29 Jul. 1979
(Grant EPA-R-805725)
(PB81-144800; EPA-600/9-80-039C-Vol-3; IERL-RTP-1063-Vol-3) Avail: NTIS HC A23/MF A01 CSCL 13B

The application of electrostatic precipitators and baghouses to power plants was addressed. Baghouses were shown to have had general success in controlling coal fired power plant emissions. When operating properly, baghouses limit emissions to less than 5 mg/cu nm at pressure drops of less than 2 kPa. Other topics considered include enforcement of control regulations, operation and maintenance factors, and fabric filters. GRA

N81-23735# RAND Corp., Santa Monica, Calif.
ECONOMIC IMPLICATIONS OF REGULATING NONAEROSOL CHLOROFLUOROCARBON EMISSION: AN EXECUTIVE BRIEFING Final Report
Adele Palmer, William E. Mooz, Timothy H. Quinn, and Kathleen A. Wolf Jul. 1980 35 p
(Contracts EPA-68-01-3882; EPA-68-01-6111)
(PB81-146698; R-2575-EPA; EPA-560/12-80-001A) Avail: NTIS HC A03/MF A01 CSCL 13B

The emissions process was reviewed and policy strategies were examined. The outcome of alternative policies were studied as to the costs to the economy as a whole, user industry expenses, mitigating transfer payments, and other policy concerns. T.M.

N81-23736# RAND Corp., Santa Monica, Calif.
FLEXIBLE URETHANE FOAMS AND CHLOROFLUOROCARBON EMISSIONS: A SUPPORT DOCUMENT FOR ECONOMIC IMPLICATIONS OF REGULATING CHLOROFLUOROCARBON EMISSIONS FROM NONAEROSOL APPLICATIONS Final Report
William E. Mooz and Timothy H. Quinn Jun. 1980 74 p refs
(Contracts EPA-68-01-3882; EPA-68-01-6111)
(PB81-146706; N-1472-EPA; EPA-560/12-80-001C) Avail: NTIS HC A04/MF A01 CSCL 13B

The methods used to proceed from the historical to the analysis of policies that might reduce chlorofluorocarbon emissions are addressed. Flexable urethane foam plants are a significant point source of CFC emissions. Recovery of CFC or methylene chloride conversion are recommended to reduce CFC releases to the atmosphere. Cost factors are also considered. J.M.S.

N81-23737# California Univ., Berkeley.
POLICY OPTIONS FOR THE TRANSPORTATION-AIR-QUALITY PROCESS Interim Report
Elizabeth Deakin, Greig Harvey, and David Calkins Sep. 1980 33 p refs Sponsored by National Commission on Air Quality
(PB81-150914; AQ-7919-16A) Avail: NTIS HC A03/MF A01 CSCL 13B

The various policy options for future transportation and air quality program integration are described. The options are derived from previous work performed as part of this study (literature reviews, discussions with government environmental, business, academic, and transportation research experts, and case studies in Milwaukee, Dallas, Fort Worth, and the San Francisco Bay area). The sections of the Clean Air Act (CAA) addressed include those dealing with transportation planning and funding (Sec. 174 and 175) and Title 1, Part D requirements for nonattainment areas. GRA

N81-23738# Environmental Protection Agency, Washington, D.C. Office of Water Program Operations.
AQUACULTURE SYSTEMS FOR WASTEWATER TREATMENT: AN ENGINEERING ASSESSMENT
Jun. 1980 135 p refs
(PB81-156689; EPA-430/9-80-007; EPA/MCD-68) Avail: NTIS HC A07/MF A01 CSCL 13B

The results of an effort to assess the current status of aquaculture technologies for wastewater treatment are presented. The assessment includes an overview and individual engineering assessments covering various wastewater aquaculture systems involving wetlands processes, aquatic plant processes, and combined aquatic processes. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N81-23739*# Ohio State Univ., Columbus. Dept. of Electrical Engineering.
ATMOSPHERIC MICROWAVE REFRACTIVITY AND REFRACTION Interim Report
Eunyoung Yu and D. B. Hodge Dec. 1980 99 p refs
(Contract NASw-3393)
(NASA-CR-164339; TR-712759-1) Avail: NTIS HC A05/MF A01 CSCL 04A

The atmospheric refractivity can be expressed as a function of temperature, pressure, water vapor content, and operating frequency. Based on twenty-year meteorological data, statistics of the atmospheric refractivity were obtained. These statistics were used to estimate the variation of dispersion, attenuation, and refraction effects on microwave and millimeter wave signals propagating along atmospheric paths. Bending angle, elevation angle error, and range error were also developed for an exponentially tapered, spherical atmosphere. T.M.

N81-23740*# Ohio State Univ., Columbus. Dept. of Electrical Engineering.
THE CTS 11.7 GHz ANGLE OF ARRIVAL EXPERIMENT Interim Report
B. W. Kwan and D. B. Hodge Jan. 1981 63 p refs
(Contract NASw-3393)
(NASA-CR-164338; ESL-712759-2) Avail: NTIS HC A04/MF A01 CSCL 04A

The objective of the experiment was to determine the statistical behavior of attenuation and angle of arrival on an Earth-space propagation path using the CTS 11.7 GHz beacon. Measurements performed from 1976 to 1978 form the data base for analysis. The statistics of the signal attenuation and

phase variations due to atmospheric disturbances are presented. Rainfall rate distributions are also included to provide a link between the above effects on wave propagation and meteorological conditions. T.M.

N81-23741*# Aerospace Corp., El Segundo, Calif.
ON THE STRUCTURES AND MAPPING OF AURORAL ELECTROSTATIC POTENTIALS
Y. T. Chiu, A. L. Newman, and J. M. Cornwall (California Univ. at Los Angeles) Feb. 1981 39 p refs
(Contracts NASw-3434; NASw-3327)
(NASA-CR-164336; SSL-81(7951)-1) Avail: NTIS HC A03/MF A01 CSCL 04A

The mapping of magnetospheric and ionospheric electric fields in a kinetic model of magnetospheric-ionospheric electrodynamic coupling proposed for the aurora is examined. One feature is the generalization of the kinetic current-potential relationship to the return current region (identified as a region where the parallel drop from magnetosphere to ionosphere is positive); such a return current always exists unless the ionosphere is electrically charged to grossly unphysical values. A coherent phenomenological picture of both the low energy return current and the high energy precipitation of an inverted-V is given. The mapping between magnetospheric and ionospheric electric fields is phrased in terms of a Green's function which acts as a filter, emphasizing magnetospheric latitudinal spatial scales of order (when mapped to the ionosphere) 50 to 150 km. This same length, when multiplied by electric fields just above the ionosphere, sets the scale for potential drops between the ionosphere and equatorial magnetosphere. M.G.

N81-23742*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REPORT OF THE NASA WORKING GROUP ON TROPOSPHERIC PROGRAM PLANNING Final Report
John H. Seinfeld, Frank Allario, William R. Bandeen, William L. Chameides, Douglas D. Davis, E. David Hinkley, and Richard W. Stewart Apr. 1981 162 p refs
(NASA-RP-1062; L-13855) Avail: NTIS HC A08/MF A01 CSCL 04A

Increased understanding of the chemical phenomena occurring in the troposphere was the research goal. Emphasis was placed on tropospheric impact on environmental quality, including public health, agriculture, climate, and weather. S.F.

N81-23743*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COORDINATED IONOSPHERIC AND MAGNETOSPHERIC OBSERVATIONS FROM THE ISIS 2 SATELLITE BY THE ISIS 2 EXPERIMENTERS. VOLUME 2: AURORAL OPTICAL EMISSIONS MAGNETIC FIELD PERTURBATIONS, AND PLASMA CHARACTERISTICS, MEASURED SIMULTANEOUSLY ON THE SAME MAGNETIC FIELD LINE
G. G. Shepherd (York Univ., Toronto) Dec. 1980 248 p refs
(NASA-TM-82283; NSSDC/WDC-A-R/S-80-09) Avail: NTIS HC A11/MF A01 CSCL 04A

The data set consists of a selected number of passes, each comprising a format combination that is most appropriate for the particular data set. A list of ISIS 2 experimenters, with addresses and telephone numbers is included. A brief description of the ISIS 2 satellite is given, followed by more detailed instrument descriptions, format descriptions, data set descriptions, and the data themselves. T.M.

N81-23744# Geological Survey, Denver, Colo.
CHANGES OF THE SQ QUIET DAILY VARIATIONS OF THE GEOMAGNETIC FIELD AS A FUNCTION OF TIME OF YEAR AND LATITUDE
Wallace H. Campbell 1981 60 p refs
(NR Proj. 081-340)
(AD-A097159) Avail: NTIS HC A04/MF A01 CSCL 08/14

An analytic representation of the quiet daily variation of the geomagnetic field, Sq, was obtained for the North American region with a mean error of less than 10% of the daily variation range. The month by month 24-, 12-, 8-, and 6-hr Fourier components of the field in H, D, and Z were found to have significant annual and semiannual changes that, in general, agreed with the expectations for ionospheric current sources for the changes. Tables and computer programs are provided from which the quiet field representation may be constructed for any selected North American location. At the equator the Sq(H) variation was over 125 gammas and showed significant equinoctial maxima. At 30 deg to 40 deg the lowest values of Sq(H) (less than 20 gammas) were representative of the region of the ionospheric current vortex. Mid-latitude Sq(D) values were about 50 gammas in range. Great enhancements of the daily field, particularly in Sq(H) and Sq(Z) occurred at high latitude with a strong summertime maximum range of about 90 gammas in Sq(H) at about 75 deg lat. Five-degree latitude representation of the quiet daily field change illustrate the variations occuring during the day and in different months of the year. Author (GRA)

N81-23745# Princeton Univ., N. J. Dept. of Statistics.
THE ESTIMATION OF PALAEOMAGNETIC POLE POSITIONS
Geoffrey S. Watson Jul. 1980 17 p refs
(Contract N00014-79-C-0322)
(AD-A097488; TR-169-SER-2) Avail: NTIS HC A02/MF 01 CSCL 20/4

The use of the Fisher distribution to estimate the mean direction of magnetization of a rock at a sampling site is now standard. Sampling sites are chosen to cover 10,000 to 100,000 years to average out the effect of secular variation. The controversy about how to combine these site means has never been satisfactorily resolved. By using statistical models for secular variation, this paper suggests how methods should be derived. A number of interesting statistical distribution and estimation problems are shown. Author (GRA)

N81-23746# Princeton Univ., N. J. Dept. of Statistics.
THE INTERACTION OF STATISTICS AND GEOLOGY - FINITE DEFORMATIONS
Geoffrey S. Watson Nov. 1980 19 p refs
(Contract N00014-79-C-0322)
(AD-A097463; TR-178-SER-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

The paper describes briefly the instances where the analysis of geological data has required the development of new statistical theory and methods. A new instance of this fruitful interaction of statistics and geology is then given. The theory of finite deformations is developed. Some of the classical and novel statistical problems which arise when objects embedded in a deformed rock are measured for strain estimation are discussed. Author (GRA)

N81-23747# Scripps Institution of Oceanography, La Jolla, Calif.
AVAILABILITY OF COPPER, NICKEL, COBALT AND MANGANESE FROM OCEAN FERROMANGANESE NODULES (3)
J. Z. Frazer and M. B. Fisk Aug. 1980 112 p
(Grant DI-BM-G0-264024)
(PB81-145971; SIO-REF-80-16; BM-OFR-140(2)) Avail: NTIS HC A06/MF A01 CSCL 08I

Manganese nodule elemental chemical data added to the SIO Sediment Data Bank during the grant year are listed. The data include compositions of 388 samples analyzed at SIO and 845 analyses extracted from the literature. Information on analytical methods utilized for all nodule analyses stored in the data bank and their estimated precision and accuracy is presented. Data summaries for potential resource areas in the northeastern equatorial Pacific are updated to include information obtained in the past 2 years. Data summaries and maps of nodule distribution are presented for resource evaluation of additional areas in the Pacific and Atlantic Oceans. GRA

N81-23748# State Univ. of New York at Buffalo. Dept. of Engineering Science, Aerospace Engineering and Nuclear Engineering.
A GENERAL INVERSE SOLUTION FOR 2D EDGE WAVES
R. P. Shaw and Y. K. Sun Feb. 1981 27 p refs
(Contract N00014-79-C-0067)
(AD-A097683; Rept-120) Avail: NTIS HC A03/MF A01 CSCL 20/10

An inverse method is used to determine topographies which will support long period edge waves along a straight coastline.

Two examples are given; one corresponds to a known solution and the other appears to be new. Author (GRA)

N81-23749# Scripps Institution of Oceanography, La Jolla, Calif. Visability Lab.
AIRBORNE MEASUREMENTS OF ATMOSPHERIC VOLUME SCATTERING COEFFICIENTS IN NORTHERN EUROPE, SUMMER, 1978 Interim Report
Richard W. Johnson and Jacqueline I. Gordon Jun. 1980 256 p refs
(Contract F19628-78-C-0200; AF Proj. 7670)
(AD-A097134; SIO-REF-80-20; SCIENTIFIC-13; AFGL-TR-80-0207) Avail: NTIS HC A12/MF A01 CSCL 04/1

This report presents daytime atmospheric optical data collected chiefly with airborne instruments during a field expedition to northern Europe in the Summer of 1978. Results from 19 flights are presented. The data include the natural irradiance upon horizontal plane surfaces, total volume scattering coefficients, and derived values of atmospheric radiance transmittance and equivalent attenuation length. Data for daytime conditions ranging from relatively clear and cloud free to completely overcast are presented. Data were measured in four spectral regions, as follows: Three narrow band optical filters with mean wavelengths of 478, 664, and 765 nanometers; and one broad band sensitivity representing a pseudo-photopic response with a mean wavelength of 557 nanometers. Selected meteorological properties, measured concurrently with radiometric data are also included. GRA

N81-23750# Air Force Geophysics Lab., Hanscom AFB, Mass.
AIRBORNE MEASUREMENT OF AEROSOL SIZE DISTRIBUTIONS OVER NORTHERN EUROPE. VOLUME 1: SPRING AND FALL 1976, SUMMER 1977 Interim Report
Ted S. Cress 29 May 1980 125 p refs
(AF Proj. 7670)
(AD-A097090; AFGL-TR-80-0178-Vol-1; AFGL-ERP-702-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 04/1

Aerosol distributions measured with a Royco 220 particle counter over northern Europe in spring 1976, fall 1976, and summer 1977 are presented. The vertical aerosol structures were measured with an integrating nephelometer and are presented to give context to discrete aerosol size distribution and concentration measurements at altitudes near 500 meters, 3000 meters, and 6000 meters. Analysis of aerosol data indicates that the aerosol distribution shapes at altitudes of 1.8 kilometers and 6.0 kilometers are very similar to distributions measured earlier over the midwestern U.S. using an impactor. Sampling analysis, and comparison to nephelometer measurements, indicate the aerosol measurements probably always represent the dry aerosol particle distribution vice the actual distribution (in balance with existing relative humidity) sensed by the nephelometer. These data provide an excellent picture of the relative changes that were found to occur in the vertical, and in space and time, with changing synoptic conditions. Author (GRA)

N81-23751# Naval Research Lab., Washington, D. C. Ionospheric Diagnostic Sect.
DNA/PLACES, BARIUM EVENT JAN: QUICK-LOOK FIELD REPORT OF 'IN SITU' PROBE MEASUREMENTS Interim Report
E. P. Szuszczewicz, J. C. Holmes, C. S. Lin, and M. Swinney 26 Mar. 1981 27 p refs
(AD-A097227; NRL-MR-4476) Avail: NTIS HC A03/MF A01 CSCL 04/1

On 12 December 1980, a 48 kg barium payload was launched from the A-15 site of the Eglin/Santa Rosa Island Test Range. The barium was released in the F sub 1-region of the ionosphere at an altitude of 182.7 km. Approximately 32 minutes later a second rocket was launched, carrying plasma diagnostics complement which included a pair of pulsed-plasma-probes and an ion mass spectrometer for direct measurements of electron density Ne, temperature Te, density fluctuations sigma Ne, associated density fluctuation power spectra Pn(k), and ion composition Mi. The barium release and all associated measurements have been designated by code name JAN. This report presents quick-look field analyses of pulsed-plasma-probe data. A brief description is given on the probe instrumentation, vehicle/payload performance, and 'in situ' observations of barium cloud plasma densities and structure. Author (GRA)

N81-23752# Naval Postgraduate School, Monterey, Calif.
ATMOSPHERIC OPTICAL PROPAGATION COMPARISONS DURING MAGAT-80
C. W. Fairall, G. E. Schacher, and K. L. Davidson Nov. 1980 45 p refs
(AD-A097274; NPS61-81-002) Avail: NTIS HC A03/MF A01 CSCL 04/1

There are three atmospheric processes responsible for the degradation of the transmission of optical images and electro-optical energy: aerosol extinction, molecular absorption, and turbulent distortion, (scintillation and beam wander). As a part of the Marine Aerosol Generation and Transport experiment (MAGAT-80), light transmission characteristics (refractive-index structure function parameter, C sub N squared, and total extinction coefficient, alpha) were measured optically on a 13.3 km path across Monterey Bay. C sub N squared and alpha can also be calculated from micrometeorological data (aerosol spectra, turbulence and mean meteorological parameters). This report is a compilation of the preliminary analysis of path-averaged (aircraft) and midpoint (ship) micrometeorological data, including calculations of the relevant optical parameters for comparison with the optical measurements. Author (GRA)

N81-23753# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
EARTH LIMB RADIANCE TRANSFORMATION Interim Report
Stephen J. Young 2 Mar. 1981 36 p refs
(Contract F04701-80-C-0081)
(AD-A097523; TR-0081(6970-04)-1; SD-81-TR-19) Avail: NTIS HC A03/MF A01 CSCL 04/1

A mathematical transformation is derived for predicting the upsounding (down-welling) infrared atmospheric radiance from measurements of the Earth limb radiance profile. The transformation is derived by writing the equation or radiactive transfer for each viewing geometry in terms of the altitude dependent volume emission function J(r) and then eliminating J(r) from the equations to define the upsounding profile directly as a weighted integral over the limb profile. An approximate transformation is derived for the important case in which the limb profile is nearly exponential with tangent height. The transformation method is limited to spectral and altitude regions for which the atmosphere is optically thin. Near the centers of strong molecular absorption bands in the mid- and far-infrared region, this limitation restricts application to altitudes above approximately 100 km. Author (GRA)

N81-23754# Maryland Univ., College Park. Inst. for Physical Science and Technology.
RIOMETER INVESTIGATIONS ON THE FRAM 1 ICE ISLAND Final Report
T. J. Rosenberg Feb. 1981 3 p
(Contract N00014-79-C-0158)
(AD-A097518) Avail: NTIS HC A02/MF A01 CSCL 04/1

The objectives of this study were to use a riometer with high sensitivity and time resolution to resolve electron-induced ionospheric absorption fluctuations in the polar cap and to search for correlations with intensity variations of magnetospheric ELF/VLF radiowave emissions. Detailed correlations, if found, would provide support for the importance of electromagnetic wave-particle interactions as a mechanism leading to electron precipitation in the polar cap. GRA

N81-23755# Naval Civil Engineering Lab., Port Hueneme, Calif.
SHOCK SPECTRUM CALCULATION FROM ACCELERATION TIME HISTORIES Technical Report, Jul. 1976 - May 1978
H. A. Gaberson Sep. 1980 67 p refs Sponsored by Naval Facilities Engineering Command
(YF53534006)
(AD-A097162; CEL-TN-1590) Avail: NTIS HC A04/MF A01 CSCL 20/11

The report mainly discusses, compares, and derives one new and improved and two popular shock spectrum computation methods. The new one is a single recursive equation method that approximates the acceleration as a straight line between

the digitized values. The new method is easily derived without recourse to Z Transform theory and, thus, should contribute to improved understanding of the computations. A new source of low frequency error common to all of the calculation methods was found, and empirical testing of the coefficients was used to establish digitizing rules to avoid the error. A FORTRAN listing of a program using the new method is given in an appendix.
Author (GRA)

N81-23756# Sandia Labs., Albuquerque, N. Mex.
LONG-TERM MEASUREMENTS OF GROUND MOTIONS OFFSHORE
Eric W. Reece and David E. Ryerson 1981 4 p refs Presented at the Intern. Conf. on Recent Advan. in Geotech. Earthquake and Soil Dyn., St. Louis, 26 Apr. 1981
(Contract DE-AC04-76DP-00789)
(SAND-80-2718C; CONF-810412-1) Avail: NTIS HC A02/MF A01

Long-term measurements of earthquake ground motions offshore show that offshore ground motions may in certain cases be substantially different from empirically predicted ground motions based on onshore data. In particular, the attenuation effects of soft and/or gassy soils, the wedging of offshore deposits as a function of direction to and distance from the source, and sharp velocity depth profiles, are shown to be possible factors contributing to such differences. The offshore ground motions are only 13 to 23 percent of those which would be calculated using empirical predictions based on onshore data. Measurements are needed to evaluate the earthquake hazards of offshore energy developments and to provide firm data on the design parameters required for the harvesting of offshore energy resources. DOE

N81-23757# California Univ., Livermore. Lawrence Livermore Lab.
CONSTITUTIVE MODELS FOR COMPRESSIVE LOADING OF GEOLOGIC MATERIALS
L. Thigpen and R. C. Y. Chin 20 Nov. 1980 22 p refs
(Contract W-7405-eng-48)
(UCRL-53073) Avail: NTIS HC A02/MF A01

Existing models are generalized with particular emphasis on ascertaining the minimum number of phenomenological coefficients required to adequately represent these models. Results show that both single- and multiple-mode plasticity models may be generalized to the same form. Five phenomenological coefficients are adequate to describe the response of strain-hardening materials to compressive loading. DOE

N81-23758# Scripps Institution of Oceanography, La Jolla, Calif.
GEOLOGICAL FACTORS RELATED TO CHARACTERISTICS OF SEAFLOOR MANGANESE NODULE DEPOSITS Open File Report, 1 Sep. 1978 - 31 Aug. 1979
J. Z. Frazer and M. B. Fisk 30 Apr. 1980 43 p refs
(Grant DI-BM-G0-264024)
(PB81-145831; BM-OFR-142-80; SIO-REF-79-19) Avail: NTIS HC A03/MF A01 CSCL 08I

The effect of geological factors such as environment of deposition, sediment type, water depth, and local topography on nodule abundance and composition are studied. Nodule abundance is shown to be strongly dependent on sedimentation rates with the most abundant deposits occurring where the sedimentation is lowest. Copper enrichment in nodules is found to be due to the concentration of this element by planktonic organisms which are limited to equatorial regions. Cobalt enrichment, generally greater in crusts than in nodules, is shown to be associated with volcanic seamounts in the mid-Pacific region. Regional variations in nickel and manganese contents, local variations in composition and abundance, and the inverse correlation between grade and abundance are discussed. GRA

N81-23508*# Air Force Geophysics Lab., Hanscom AFB, Mass.
THE SOLAR ULTRAVIOLET SOURCE FOR THE IONOSPHERE AND ITS VARIATION
Hans E. Hinteregger *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
(NASA Order S-50030-AG)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23510# Imperial Coll. of Science and Technology, London (England). Blackett Lab.
MAGNETOSPHERIC AND IONOSPHERIC FLOW AND THE INTERPLANETARY MAGNETIC FIELD
S. W. H. Cowley *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 14 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23511# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
MAGNETOSPHERIC INFLUENCES ON THE IONOSPHERE
H. Kohl *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23512# Technische Hochschule, Darmstadt (West Germany).
IONOSPHERIC DISTURBANCES OF MAGNETOSPHERIC ORIGIN
H. Poeverlein and E. Neske (Fraunhofer-Inst. fuer Physikalische Messtechnik, Freiburg) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23513*# Lockheed Missiles and Space Co., Palo Alto, Calif.
MAGNETOSPHERE-IONOSPHERE COUPLING THROUGH THE AURORAL ACCELERATION REGION
R. D. Sharp and E. G. Shelley *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 13 p refs (For primary document see N81-23507 14-42)
(Contracts NAS5-25773; NAS2-3395; Grant NSF ATM-79-11174)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23514*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
MODELLING THE HIGH-LATITUDE IONOSPHERE
W. J. Raitt, R. W. Schunk, and J. J. Sojka *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 14 p refs (For primary document see N81-23507 14-42)
(Contracts NAG2-77; F19628-79-C-0025; Grant NSF ATM-78-10501)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23516# Bonn Univ. (West Germany). Radioastronomical Inst.
ELECTRODYNAMICS OF THE LOWER IONOSPHERE
Hans Volland *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 13 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23517# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
THE EFFECTS OF AURORAL ACTIVITY ON THE MID-LATITUDE IONOSPHERE
Michel Blanc *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23518# Auroral Observatory, Tromso (Norway).
CURRENTS IN THE AURORAL ZONE IONOSPHERE
Asgeir Brekke *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 9 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23519# Auroral Observatory, Tromso (Norway).
NEUTRAL WINDS IN THE POLAR IONOSPHERE
Asgeir Brekke *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23520*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for Planetary Atmospheres.
ELECTRICAL COUPLING BETWEEN THE LOWER ATMOSPHERE AND THE IONOSPHERE
Richard A. Goldberg *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23521# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
FIRST RESULTS FROM THE TROMSOE IONOSPHERIC MODIFICATION FACILITY
P. Stubbe, H. Kopka, A. Brekke, T. Hansen, O. Holt, R. L. Dowden, T. B. Jones, T. Robinson, H.-J. Lotz, and J. Waterman *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. Systems Feb. 1981 9 p refs Prepared in cooperation with Tromsoe Univ., Norway and Otago Univ., Dunedin, New Zealand and Leicester Univ., England and Goettingen Univ., West Germany (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23522*# Boston Univ., Mass. School of Arts and Sciences.
A SUMMARY OF ROCKET-INDUCED IONOSPHERIC PERTURBATIONS
Michael Mendillo and Jeffrey Forbes *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 9 p refs Prepared in cooperation with Boston Coll., Mass. (For primary document see N81-23507 14-42)
(Contract NAS8-32844)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23523*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
IONOSPHERIC COMPOSITION: THE SEASONAL ANOMALY EXPLAINED
D. G. Torr, P. G. Richards, and M. R. Torr (National Inst. for Telecommunications Research, Johannesburg, South Africa) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 15 p refs (For primary document see N81-23507 14-42)
(Contract NAS5-24331; Grant NSF ATM-80-05088)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23524# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
THERMOSPHERIC NEUTRAL COMPOSITION CHANGES AND THEIR CAUSES
P. Bauer *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 6 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23525# Institut Royal Meteorologique de Belgique, Brussels.
RELATIONS BETWEEN SOLAR FLUX AND E-REGION PARAMETERS
Marcel Nicolet and Lucien Bossy *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 10 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23526*# Illinois Univ. at Urbana-Champaign. Aeronomy Lab.
ENERGETIC PARTICLE PRECIPITATION AT MIDDLE AND LOW LATITUDES
L. G. Smith and H. D. Voss *In* AGARD The Phys. Basis of the Ionosphere in the Terrest. System Feb. 1981 6 p refs (For primary document see N81-23507 14-42)
(Grant NGR-14-005-181)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23528# Institut fuer Astrophysik und Extraterrestrische Forschung, Bonn (West Germany).
ON THE MORPHOLOGY OF THE POLAR THERMOSPHERE
G. W. Proelss *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 8 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23529# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
STRUCTURE OF ELECTRON TEMPERATURE
H. Thiemann *In its* The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 9 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23530*# Illinois Univ. at Urbana-Champaign. Aeronomy Lab.
MIDLATITUDE SPORADIC-E LAYERS
L. G. Smith and K. L. Miller *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 6 p refs (For primary document see N81-23507 14-42)
(Grant NGR-14-005-181)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23531# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
THE SEASONAL AND GEOGRAPHICAL VARIATION OF EQUATORIAL SPREAD-F IRREGULARITIES INFLUENCED BY ATMOSPHERIC GRAVITY WAVES AND ELECTRIC FIELDS DUE TO THUNDERSTORMS
J. Roettger *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 3 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A18/MF A01

N81-23532# Toulouse Univ. (France). Lab. de Sondages Electromagnetiques de l'environnement Terrestre.
PLASMA INSTABILITIES IN THE ELECTROJETS
M. Crochet *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs In FRENCH; ENGLISH summary (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23533# Oslo Univ. (Norway).
DYNAMICS OF THE DAYSIDE CUSP AURORA
A. Egeland, P. E. Sandholt, K. Henriksen, C. S. Deehr, and G. G. Sivjee *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 8 p refs Prepared in cooperation with Tromsoe Univ., Norway and Alaska Univ., Fairbanks (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23534*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LARGE-SCALE WAVES IN THE IONOSPHERE OBSERVED BY THE AE SATELLITE
S. H. Gross (Polytechnic Inst. of New York, Farmingdale), C. A. Reber, and F. Huang (Computer Sciences Corp., Silver Spring, Md.) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 10 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01 CSCL 04A

N81-23539# Freiburg Univ. (West Germany).
THE DAY-BY-DAY VARIABILITY OF THE IONOSPHERIC PEAK DENSITY
K. Rawer, E. Harnischmacher, and R. Eyfrig *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23540# Leicester Univ. (England). Dept. of Physics.
EXPERIMENTAL VALIDATION OF THE ONSOD OMEGA PREDICTION METHOD
T. B. Jones and K. Mowforth *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 19 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23541# Istituto Nazionale di Geofisica, Rome (Italy). Ionospheric Dept.
SOME CONSIDERATIONS UPON MODELS FOR IONOSPHERIC RADIO COMMUNICATIONS FORECASTING
P. Dominici and B. Zolesi *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 16 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23999*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communication Systems Research Sect.
A FREQUENCY AND TIMING SUBSYSTEM FOR THE ORION MOBILE UNIT
P. A. Clements *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 3-10 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 14B

N81-24008*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Sect.
CALCULATION OF ATMOSPHERIC LOSS FROM MICROWAVE RADIOMETRIC NOISE TEMPERATURE MEASUREMENTS
C. Stelzried and S. Slobin *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 73-80 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 04A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N81-23759 European Space Agency, Paris (France).
A CLIMATOLOGICAL GUIDE FOR METEOSAT USERS
U. Liepelt, comp., R. Paulisch, comp., and W. R. Burke, ed. Dec. 1980 143 p refs Prepared in cooperation with European Space Operations Center, Darmstadt, West Germany
(ESA-SP-1027; ISSN-0379-6566) Avail: NTIS HC A07/MF A01

Climatological data and meteorological charts are presented for the Atlantic Ocean, Europe, and Africa. The data consist of sea-surface temperature, upper air temperature, and relative humidity. T.M.

N81-23760*# Alabama Univ. in Huntsville. School of Science and Engineering.
IONOSPSHERIC OBSERVATION OF ENHANCED CONVECTION-INITIATED GRAVITY WAVES DURING TORNADIC STORMS Final Report
R. J. Hung Washington May 1981 35 p refs
(Contract NAS8-31171)
(NASA-CR-3419; M-346; Rept-260) Avail: NTIS HC A03/MF A01 CSCL 04B

Atmospheric gravity waves associated with tornadoes, with locally severe storms occuring with tornadoes, and with hurricanes were studied through the coupling between the ionosphere and the troposphere. Reverse group ray tracing computations of gravity waves observed by an ionospheric Doppler sounder array were analyzed. The results of ray tracing computations and comparisons between the computed location of the wave sources and with conventional meteorological data indicate that the computed sources of the waves were near the touchdown of the tornadoes, near the eye of the hurricanes, and directly on the squall line of the severe thunderstorms. The signals excited occurred one hour in advance of the tornadoes and three hours in advance of the hurricanes. Satellite photographs show convective overshooting turrets occurring at the same locations and times the gravity waves were being excited. It is suggested that gravity wave observations, conventional meteorological data, and satellite photographs be combined to develop a remote sensing technique for detecting severe storms. J.D.H.

N81-23761*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ENERGETICS OF A SUDDEN STRATOSPHERIC WARMING SIMULATED WITH A THREE-DIMENSIONAL, SPECTRAL, QUASI-GEOSTROPHIC MODEL
Kenneth V. Haggard and William L. Grose May 1981 30 p refs
(NASA-TP-1847; L-14245) Avail: NTIS HC A03/MF A01 CSCL 04B

The energetics of a three dimensional, quasi-geostrophic simulation of a sudden stratospheric warming which developed spontaneously during an annual cycle simulation are described. Daily values of the stratospheric temperatures, zonal winds, heating rates, energies, and energy conversions are discussed and compared with those for observed warmings. It is shown that, like observed warmings, the simulated warming was preceded by an increased vertical flux of eddy kinetic energy from the troposphere and the polar heating resulted because of the strong convergence of the horizontal, eddy heat flux which was only partially balanced by adiabatic and diabatic cooling. There is a significant similarity between the energetics of the simulated and observed warmings. In addition, the warming was spontaneous and the model did not develop a major warming in each winter of the simulation. These facts suggest that this model may be useful for studying not only the warming process but also the conditions that favor its development. M.G.

N81-23762*# California Univ., Los Angeles. Dept. of Atmospheric Sciences.
AN EFFICIENT CODE FOR THE SIMULATION OF NONHYDROSTATIC STRATIFIED FLOW OVER OBSTACLES
Gregory G. Pihos and Morton G. Wurtele Apr. 1981 137 p refs
(Grants NsG-4024; NsG-4001)
(NASA-CR-3385) Avail: NTIS HC A07/MF A01 CSCL 04B

The physical model and computational procedure of the code is described in detail. The code is validated in tests against a variety of known analytical solutions from the literature and is also compared against actual mountain wave observations. The code will receive as initial input either mathematically idealized or discrete observational data. The form of the obstacle or mountain is arbitrary. T.M.

N81-23763*# Atsuko Computing International, Huntsville, Ala.
RESEARCH STUDY: STS-1 ORBITER DESCENT Final Report
John S. Hickey 22 Apr. 1981 45 p
(Contract NAS8-34334)
(NASA-CR-161754; ACI-042281-F) Avail: NTIS HC A03/MF A01 CSCL 04B

The conversion of STS-1 orbiter descent data from AVESESAME contact programs to the REEDA system and the reduction of raw radiosonde data is summarized. A first difference program, contact data program, plot data program, and 30 second data program were developed. Six radiosonde soundings were taken. An example of the outputs of each of the programs is presented. J.D.H.

N81-23764*# Alabama A & M Univ., Normal. Dept. of Mathematics.
STATISTICAL CLASSIFICATION TECHNIQUES FOR ENGINEERING AND CLIMATIC DATA SAMPLES Final Technical Report
Enoch C. Temple and Jerry R. Shipman Apr. 1981 105 p refs
(Grant NsG-8065)
(NASA-CR-164337; AAMU-NsG-8065-03) Avail: NTIS HC A06/MF A01 CSCL 04B

Fisher's sample linear discriminant function is modified through an appropriate alteration of the common sample variance-covariance matrix. The alteration consists of adding nonnegative values to the eigenvalues of the sample variance covariance matrix. The desired results of this modification is to increase the number of correct classifications by the new linear discriminant function over Fisher's function. This study is limited to the two-group discriminant problem. T.M.

N81-23765*# City Univ. of New York, N. Y. Dept. of Earth and Planetary Sciences.
THE EFFECT OF SURFACE BOUNDARY CONDITIONS ON

THE CLIMATE GENERATED BY A COARSE-MESH GENERAL CIRCULATION MODEL
Charles Cohen Jun. 1981 141 p refs
(Grant NGR-33-016-086)
(NASA-CR-164296) Avail: NTIS HC A07/MF A01 CSCL 04B

A hierarchy of experiments was run, starting with an all water planet with zonally symmetric sea surface temperatures, then adding, one at a time, flat continents, mountains, surface physics, and realistic sea surface temperatures. The model was run with the sun fixed at a perpetual January. Ensemble means and standard deviations were computed and the t-test was used to determine the statistical significance of the results. The addition of realistic surface physics does not affect the model climatology to as large as extent as does the addition of mountains. Departures from zonal symmetry of the SST field result in a better simulation of the real atmosphere. T.M.

N81-23766*# Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
RAWINPROC: COMPUTER PROGRAM FOR DECOMMUTATING, INTERPRETING, AND INTERPOLATING RAWINSONDE METEOROLOGICAL BALLOON SOUNDING DATA Final Report, 16 Oct. 1980 - 28 Feb. 1981
Forrest L. Staffanson Feb. 1981 164 p refs
(Contract NAG6-8)
(NASA-CR-164315; UTEC-MR-81-031) Avail: NTIS HC A08/MF A01 CSCL 04B

The FORTRAN computer program RAWINPROC accepts output from NASA Wallops computer program METPASS1; and produces input for NASA computer program 3.0.0700 (ECC-PRD). The three parts together form a software system for the completely automatic reduction of standard RAWINSONDE sounding data. RAWINPROC pre-edits the 0.1-second data, including time-of-day, azimuth, elevation, and sonde-modulated tone frequency, condenses the data according to successive dwells of the tone frequency, decommutates the condensed data into the proper channels (temperature, relative humidity, high and low references), determines the running baroswitch contact number and computes the associated pressure altitudes, and interpolates the data appropriate for input to ACC-PRD. T.M.

N81-23767# Battelle Columbus Labs., Durham, N. C.
COMPARISON OF THE CLIMATES OF SELECTED LOCATIONS IN THE UNITED STATES WITH THE CLIMATE OF BEERSHEBA, ISRAEL Final Report
Claude E. Duchon Jan. 1981 194 p refs Prepared in cooperation with Oklahoma Univ., Norman
(Contract DAAG29-76-D-0100; DA Proj. 1L1-62111-AH-71)
(AD-A097529; ERADCOM/ASL-CR-81-0100-2) Avail: NTIS HC A09/MF A01 CSCL 04/2

A comparison has been made of the climates of Daggett, California; El Paso, Texas; Fort Huachuca, Arizona; and Yuma, Arizona, with the climate of Beersheba, Israel, located in the northern Negev. The purpose of the study was to find a location in the US near an Army installation that has a climate similar to Beersheba. Based on a preliminary climate assessment, the above four stations were selected for an in-depth analysis along with Beersheba. Author (GRA)

N81-23768# Federal Aviation Administration, Atlantic City, N.J.
GROUNDSPEED/AIRSPEED DIFFERENCES AS A WIND SHEAR INDICATOR AND FLIGHT EVALUATION OF A DME-DERIVED SYSTEM TO DETERMINE GROUNDSPEED Final Report, Feb. 1978 - Feb. 1980
David M. Lawrence Feb. 1981 64 p refs
(FAA Proj. 154-451-180)
(AD-A097566; FAA-CT-80-29; FAA-RD-81-1) Avail: NTIS HC A04/MF A01 CSCL 01/3

The use of groundspeed in conjunction with airspeed as a wind shear indicator is discussed. It is shown that a satisfactory indication of headwind can be obtained using indicated airspeed and a low-cost groundspeed measurement device. This report describes the flight test and evaluation of a distance measuring equipment (DME) range-rate derived system for measuring airplane groundspeed. The system consists of a specially developed airborne unit operating in conjunction with unmodified very high frequency omnidirectional radio range (VOR)/DME ground stations. Operating at ranges up to 50 nautical miles in level flight directly toward or away from the ground station, the root mean square (RMS) groundspeed error is 3 to 5 knots. In landing approaches or climbout, the RMS error is 4 to 8 knots. Author (GRA)

N81-23769# Federal Aviation Administration, Atlantic City, N.J.
EVALUATION OF THE TRANSCRIBED WEATHER BROADCAST (TWEB) SYSTEM AND ALTERNATIVES. VOLUME 2: COST ANALYSES OF THE TWEB RADIO AND TELEPHONE ACCESSIBLE MASS WEATHER DISSEMINATION SERVICES Final Report, Mar. 1978 - Aug. 1979
John D. Barab Feb. 1981 102 p refs
(FAA Proj. 131-401-840)
(AD-A097567; FAA-CT-80-6-2-Vol-2; FAA-RD-80-63-2-Vol-2)
Avail: NTIS HC A06/MF A01 CSCL 17/7

In Volume 2, a comprehensive, in-depth account is afforded for each facet of the cost analyses. Explanations are furnished as to methodologies of approach followed, procedures used, and criteria adhered to in the collection, reduction, and analyses of data pertinent to the component categories of costs applicable to each service. In each instance, the individual analyses were based on the respective equipment configurations of the services as they existed in the contiguous United States at the close of calendar year 1978. The narrative aspects of the cost analyses are augmented by tabular data which reflect the estimated costs incurred for each cost component on a region-by-region basis. Overall, the total estimated calendar year 1978 national aggregate cost for the TWEB radio service and telephone accessible mass weather dissemination services was determined to be approximately $4.8 million. GRA

N81-23770# Utah Univ., Salt Lake City. Dept. of Meteorology.
DEVELOPMENT OF INFRARED AND MICROWAVE TECHNIQUES FOR CLOUD PARAMETER INFERENCE FROM SATELLITE IMAGERY AND SOUNDER DATA Final Report, 16 Apr. 1978 - 30 Jul. 1980
Kuo-Nan Liou, H. Y. Yeh, F. M. Chen, K. Hutchison, and E. Astling 30 Aug. 1980 98 p refs
(Contract F19628-78-C-0130; AF Proj. 6670)
(AD-A097592; AFGL-TR-80-0263) Avail: NTIS HC A05/MF A01 CSCL 04/2

This report presents research to improve estimates of cloud parameters when both microwave and infrared data are available from weather satellites. The Defense Meteorological Satellite Program (DMSP) will have both types of data in 1983 with the first flight of the SSM/I multispectral microwave imager and improved cloud estimates could then be available to the AFGWC automated cloud analysis known as 3DNEPH. In this report, radiative transfer programs have been improved so that microwave channels can be simulated in a realistic manner. Also, the results of simulations have been compared to measurements from the ESMR, SCAMS, and HIRS sensors on the Nimbus 6 satellite, which was the most complete set of microwave and infrared data available at the time of this study. The first area is concerned with the investigation of the effect of clouds and precipitation on the Nimbus 6 ESMR channel and the use of ESMR vertical and horizontal polarization components for the determination of the liquid water content and cloud thickness. In conjunction with these objectives, we have developed a microwave radiative transfer program taking into account the polarization effect. The second area deals with the use of both infrared and microwave channels for the cloud parameter inference parameterizations. The infrared and microwave radiative transfer programs are successively developed for retrieval of the high and low cloud top heights and thicknesses and the cloud liquid water content from selected HIRS and SCAMS channels of the Nimbus 6 satellite. GRA

N81-23771# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex. Atmospheric Sciences Lab.
WEATHER SCENARIOS FOR CENTRAL GERMANY Final Report
Bruce T. Miers Feb. 1981 165 p refs
(DA Proj. 1L1-62111-AH-71)
(AD-A097527; ERADCOM/ASL-TR-0078) Avail: NTIS HC A08/MF A01 CSCL 04/2

A weather scenario can be defined as a realistic synthesis

of sensible weather conditions over a specified area and time frame. A weather scenario should not be confused with operational weather forecasts provided by weather support personnel. The need for realistic weather to be introduced into war gaming models has been the impetus for developing weather scenarios for central Germany. Factors considered in developing these scenarios were: (1) latitude, (2) elevation (3) terrain features, (4) distribution of land and water, (5) pressure center paths, (6) ocean currents, (7) air mass transport, and (8) upper level winds. Although this report contains meteorological terminology, the scenarios are easily understood and have been used effectively by the nonmeteorologist. These scenarios have been provided to the US Army Concepts Analysis Agency and the US Army TRADOC Systems Analysis Activity. Author (GRA)

N81-23772# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex. Atmospheric Sciences Lab.

AIR MASS CONSIDERATIONS IN FOG OPTICAL MODELING Final Report

Louis D. Duncan and James D. Lindberg Feb. 1981 44 p refs

(DA Proj. 1L1-62111-AH-71)

(AD-A097609; ERADCOM/ASL-TR-0075) Avail: NTIS HC A03/MF A01 CSCL 04/2

Measurements of fog and haze drop-size distributions taken during the last 4 years at various locations in Germany have been analyzed to determine relations for prediction of infrared extinction coefficients from visibility (actually meteorological range). Mie calculations were applied to the measured drop-size distributions to compute the extinction coefficient at 0.55 micrometers, 4 micrometers, and 10 micrometers. For given values of the meteorological range between 1 and 4 km it was observed that the variation in the extinction coefficient at both 4 micrometers and 10 micrometers exceeded an order of magnitude. The data sets were then subdivided according to the air mass which prevailed over the measurement site at the time of the measurements. With this subdivision according to air mass type the data spread was reduced to ranges which are considered reasonable for measured data. Figures are included which depict this behavior. Algorithms have been developed for predicting the extinction coefficient at 4 micrometers and 10 micrometers from values of the extinction coefficient at 0.55 micrometers. Separate algorithms have been determined for three different air mass types: maritime arctic, maritime polar, and continental polar. Author (GRA)

N81-23773# Control Data Corp., Minneapolis, Minn. Research and Advanced Design Lab.

MESOSCALE VARIABILITY OF THE ATMOSPHERIC WIND FIELD BELOW 5 KM Final Report, 1 Apr. 1976 - 31 Jan. 1981

W. H. Jasperson Mar. 1981 12 p refs

(Contract DAAG29-76-C-0010)

(AD-A097414; ARO-13474.2-GS) Avail: NTIS HC A02/MF A01 CSCL 04/2

This report summarizes the effort and results of an extensive study of the mesoscale wind field. In particular, the temporal and spatial variability of the wind in the first five kilometers of the atmosphere was examined in terms of power law relationships. Author (GRA)

N81-23774# Naval Oceanography Command Detachment, Asheville, N.C.

SUMMARY OF SYNOPTIC METEOROLOGICAL OBSERVATIONS (SSMO), CENTRAL AMERICAN COASTAL MARINE AREAS WEST COAST. VOLUME 1: AREA 1 CENTRAL BAJA WEST, AREA 2, SOUTHWEST BAJA, AREA 3 - GULF OF CALIFORNIA, AREA 4 - MAZATLAN, AREA 5 - PUERTO VALLARTA

Feb. 1981 401 p

(AD-A097429) Avail: NTIS HC A18/MF A01 CSCL 04/2

The SSMO series of coastal marine summaries is managed and produced by the Naval Oceanography Command Detachment, Asheville, N.C. for the Commander, Naval Oceanography Command. A list of published SSMO's is contained in the catalogue part of the 'Guide to Standard Weather Summaries and Climatic Services', NAVAIR 50-1C-534. The data summarized in the tables were obtained from Tape Data Family 11 (TDF-11) Marine Surface Observations. The development and maintenance of TDF-11 was primarily funded by the Naval Oceanography Command. The source of these marine surface observations was punched cards of weather observation taken aboard vessels of varying registry. These observations were recorded on magnetic tape in a common format. Elements not in WMO code were converted to this code where possible. Where this was not possible, the original data were retained within the tape record as supplemental data. A very limited quality control was attempted as the punched cards were converted to taped records and, where possible, missing psychrometric data were computed. GRA

N81-23775# Naval Oceanography Command Center/Joint Typhoon Warning Center, Guam.

TROPICAL CYCLONE FORECAST VERIFICATION AS A FUNCTION OF RECONNAISSANCE PLATFORM

Gerald A. Guay Oct. 1980 14 p refs

(AD-A097454; NAVOCEANCOMC/JTWC-TN-80-3) Avail: NTIS HC A02/MF A01 CSCL 04/2

Harrison (1975) examined tropical cyclone forecast accuracy as a function of the reconnaissance platform used as the basis for each forecast's initial position. Using 1973 and 1974 data, Harrison showed that forecasts based on aircraft position fixes were most accurate. This paper used data collected from 1977-1979 to update Harrisons's study. The present analysis shows that, overall, tropical cyclone initial positions and forecasts based on aircraft positions fixes were most accurate when compared to the Joint Typhoon Warning Center's best tracks. Unlike the earlier study, forecasts based on satellite reconnaissance were more accurate than forecasts based on aircraft reconnaissance for tropical cyclones which never reached typhoon intensity. Author (GRA)

N81-23776# Naval Environmental Prediction Research Facility, Monterey, Calif.

COMPARISON OF THE MARINE INDEX OF REFRACTION STRUCTURE PARAMETER, C2n, MODEL WITH OPTICAL MEASUREMENTS Final Report

Andreas K. Goroch Dec. 1980 33 p refs

(AD-A097691; NEPRF-TR-80-09) Avail: NTIS HC A03/MF A01 CSCL 20/6

The Monterey Bay turbulence model verification experiment was conducted to verify correlation models of bulk meteorological and optical turbulence. Laser scintillometer measurements were compared to predictions of the bulk model using meteorological data measured by R/V ACANIA. Results indicate that the model predicts optical turbulence to within a factor of two in homogenous cases. Satellite measurements suggest possible applications to verifying homogeneity for use of the bulk models. The bulk model results did not correlate to optical measurements when infrared rather than bucket temperatures were used. Although three separate IR temperatures (surface, aircraft, satellite) agreed with each other, they seemed to be a bias of 1.5 degrees below the bucket temperature. Author (GRA)

N81-23777# Illinois State Water Survey, Urbana. Meteorology Section.

LOW-LEVEL CONVERGENCE AND THE PREDICTION OF CONVECTIVE PRECIPITATION IN SOUTH FLORIDA

Andrew I. Watson, Ronald L. Holle, John B. Cunning, Patrick T. Gannon, and David O. Blanchard Feb. 1981 235 p refs Prepared in cooperation with NOAA, Boulder, Colo.

(Contract MIPR-ARO-20-78; Grant NSF ATM-78-08865)

(AD-A097553; TR-4; ARO-15529.6-GS) Avail: NTIS HC A11/MF A01 CSCL 04/2

A reliable method is presented for the prediction of convective precipitation in south Florida. Total area divergence is statistically related to area rainfall as derived by radar in a mesoscale region on the order of 1400 sq km. Various network grids and sizes are examined to find the best scale to measure total area divergence. The response of visible clouds to surface convergence is investigated with time-lapse photographs taken in the FACE mesonetwork. One case study of a convective storm complex as measured by Doppler radar and surface pressure data is presented. Finally, vertical adjustment factors are determined for surface winds under varying meteorological conditions and time of day. GRA

N81-23778# Calspan Advanced Technology Center, Buffalo, N.Y.

AN INVESTIGATION OF MARINE FOG FORECAST CONCEPTS Annual Report

C. W. Rogers, E. J. Mack, R. J. Rilie, and B. J. Wattle Jan. 1981 104 p refs

(Contract N00019-80-C-0248)

(AD-A097338; CALSPAN-6673-M-1; ASR-8) Avail: NTIS HC A06/MF A01 CSCL 04/2

As a follow-on to eight years of field study of marine fog, an investigation of potential fog forecasting concepts was initiated. Task 1 involved examination and interpretation of synoptic scale meteorological data in terms of micro- and meso-scale marine fog data acquired by Calspan on previous West Coast field studies. The results of this investigation were summarized in an experimental 'decision tree' for use in the forecasting of marine fog. As Task 2, Calspan conducted a descriptive investigation of the circumstances and characteristics of marine fog occurring in the northern Gulf of Mexico through analysis and interpretation of fog data previously acquired by Calspan during the Panama City II experiment. GRA

N81-23779# TRC Environmental Consultants, Inc., Wethersfield, Conn.

METEOROLOGICAL AND AIR QUALITY DATA REPORT. WIPP SITE: EDDY COUNTY, NEW MEXICO Final Report, Mar. 1978 - Feb. 1980

L. P. Pocalujka, E. Babij, P. A. Catizone, and H. W. Church (Sandia Labs., Albuquerque, N. Mex.) Feb. 1981 71 p refs

(Contract DE-AC04-76DP-00989)

(SAND-81-7052) Avail: NTIS HC A04/MF A01

The suitability of a site in southeastern New Mexico was assessed for use as a repository for defense transuranic wastes designated as recurring deep geological disposal. Equipment used for radiological, meteorological, and air quality measurement is described as well as the data acquisition system. Monitored parameters are listed and results tabulated and plotted. DOE

N81-23780# National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.

AN EVALUATION OF CLIMATIC IMPACT OF THE NIAGARA ICE BOOM RELATIVE TO AIR AND WATER TEMPERATURE AND WINTER SEVERITY

Frank H Quinn, Raymond A. Assel, and Daniel W. Gaskill Aug. 1980 38 p refs

(PB81-140931; NOAA-TM-ERL-GLERL-30; GLERL-CONTRIB-232; NOAA-80111002) Avail: NTIS HC A03/MF A01 CSCL 04B

The objective of this study was to determine if the Niagara River ice boom installed every winter since 1964-65 has prolonged the Lake Erie ice cover at Buffalo, NY, resulting in significant changes in the spring warm-up of Lake Erie and longer, colder winters in the area. On the basis of the analysis, there is no evidence that the operation of the ice boom has either extended Buffalo winters or made them more severe. GRA

N81-23781# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

FEASIBILITY STUDY OF SATELLITE-BORNE LIDAR GLOBAL WIND MONITORING SYSTEM, PART 2

R. M. Huffaker, T. R. Lawrence, R. J. Kellar, M. J. Post, J. T. Priestley, and J. A. Korrel Aug. 1980 132 p refs Sponsored in part by DOD, Washington, D.C.

(PB81-145369; NOAA-TM-ERL-WPL-63; NOAA-80110706) Avail: NTIS HC A07/MF A01 CSCL 04B

This detailed feasibility study for a satellite-borne pulsed coherent CO2 lidar at 800 km altitude for global wind monitoring shows that a tropospheric wind measurement error of 1 m/s for typical operational parameters and of 2 m/s for worst case models is possible. The required power, pointing precision, weight, data handling, and communication are within the capacity of the Space Shuttle or state-of-the-art add-on units. Lack of sufficient global aerosol data was identified as the principal unknown in the analysis. GRA

N81-23509# Fraunhofer Inst., Freiburg (West Germany).

SOLAR RADIATIONS AND THEIR INTERACTIONS WITH THE TERRESTRIAL ENVIRONMENT

G. Schmidtke *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)

Avail: NTIS HC A17/MF A01

N81-23527*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.

ENERGETIC O-POSITIVE PRECIPITATION: A SIGNIFICANT ENERGY

Marsha R. Torr, D. G. Torr, and R. Roble (National Center for Atmospheric Research, Boulder, Colo.) *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 11 p refs (For primary document see N81-23507 14-42)

(Contracts NAS8-33992; NAS5-24331)

Avail: NTIS HC A17/MF A01 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N81-23782# Woods Hole Oceanographic Institution, Mass. Dept. of Ocean Engineering.

A FEASIBILITY STUDY FOR A VERSATILE DEEP SEA, MULTILEG, STABLE, CABLE ARRAY

Henri O. Berteaux and Robert G. Walden Mar. 1981 89 p refs

(Contract N00014-79-C-0894)

(AD-A097672; WHOI-81-13) Avail: NTIS HC A05/MF A01 CSCL 08/3

The purpose of this study is to investigate the feasibility of designing, building, and deploying a large, stable, multileg, deep ocean cable array with a service life of at least five years, and to assess the cost of such an array. The study first defines the essential desirable features of the array. It then briefly describes a number of candidate configurations which can meet these requirements, pointing out their advantages and disadvantages. The report concludes that such an array is feasible, that it can be implanted with a high expectation of reliability and that it can be a safe and stable structure from which to conduct divers novel and useful scientific experiments. GRA

N81-23783# Columbia Univ., Palisades, N.Y. Lamont-Doherty Geological Observatory.

FEASIBILITY OF LARGE SCALE DELIBERATE TRACER RELEASE EXPERIMENTS IN OR BELOW THE OCEANIC THERMOCLINE Final Report

John G. Shepherd and W. S. Broecker Feb. 1981 60 p refs

(Contract DE-AC02-79EV-10038)

(DOE/EV-10038/1) Avail: NTIS HC A04/MF A01

The feasibility was investigated of a proposed experiment in which a large quantity of a suitable tracer would be deliberately released in deep water, and its subsequent dispersion followed for at least one year. Helium-3 would be the most suitable tracer, with tritium as a possible alternative. About 30 g f helium-3 would be needed for each release. Such a quantity may be dissolved in about 1 m(3) of water at pressures greater than 500 dbar. Concentrations would have fallen to unmeasurable levels by the time the patch had spread sufficiently to interfere with measurements of natural or radiogenic helium-3. It is estimated that it would be around 1000 km across after one year, and anything from a few meters to a few hundred meters thick. Vertically integrating samples would probably be most suitable used in conjunction with ship-board helium-3 mass spectrometer. The cost would be several million dollars spread over several years. DOE

N81-23784# Edgerton, Germeshausen and Grier, Inc., Waltham, Mass.

PHYSICAL OCEANOGRAPHIC DATA FROM THE OTEC PUNTA TUNA, PUERTO RICO SITE, SEPTEMBER 1979 - JUNE 1980

Daniel Frye, Allan Davison, and Karen Leavitt Berkeley, Calif. California Univ., Lawrence Berkeley Lab. Jan. 1981 170 p refs

(Contract W-7405-eng-48)

(LBL-12327) Avail: NTIS HC A08/MF A01

The first results of an oceanographic measurement program being conducted off the southeast corner of Puerto Rico are presented. The study site is a proposed OTEC site and is located about 20 km off Punta Tuna. Oceanographic measurements include: (1) a subsurface mooring instrumented with five current, temperature, and pressure recorders; and (2) quarterly hydrographic cruises to measure salinity, temperature, and depth profiles on a grid of 33 statibns in the vicinity of the mooring site. DOE

N81-23785# Alabama Univ., University. Bureau of Engineering Research.

HYDRODYNAMICS OF MOBILE BAY AND MISSISSIPPI SOUND Interim Report

Donald C. Raney, Gary C. April, Lih Chern, John Phillip Jarrell, Yieng-Chiang Wu, and Der-Jang Lou Mar. 1980 108 p refs Prepared in cooperation with Mississippi-Alabama Sea Grant Consortium, Ocean Springs, Miss.

(PB81-137416; BER-247-112; NOAA-80120306; MASGP-79-020) Avail: NTIS HC A06/MF A01 CSCL 08C

Numerical modeling of Mobile Bay has demonstrated the value of a predictive capability describing water movement and elevation in coastal waters. Each of these water bodies influences the circulation within the other. During 1979, successful adaptation of models to Mississippi Sound and Mobile Bay was achieved. Investigations were initiated into water quality models, storm surge models, three dimensional models and sediment transport processes. GRA

N81-23786# National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.

PHYSICAL ENVIRONMENT OF THE EASTERN BERING SEA, MARCH 1979

S. A. Salo, C. H. Pease, and R. W. Lindsay May 1980 129 p refs

(PB81-148496; NOAA-TM-ERL-PMEL-21; CONTRIB-467; NOAA-80110705) Avail: NTIS HC A07/MF A01 CSCL 08J

Two analyses of data collected by the NOAA Ship Surveyor are presented. The first section presents CTD's and data on sea surface temperature and salinity and on surface winds and air temperature. The data indicate that ice was advected south to the ice edge by northerly winds, and that net melting occurred at the ice edge. The second section describes two cases when cold continental air moved from the ice over the water at the edge. An estimate is made of the resulting surface heat flux. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N81-23787# Naval Research Lab., Washington, D. C. Environmental Biology Branch.

DRAG ENHANCEMENT OF MICROBIAL SLIME FILMS ON ROTATING DISCS Final Report

George I. Loeb 27 Mar. 1981 20 p refs

(AD-A097228; NRL-MR-4412) Avail: NTIS HC A02/MF A01 CSCL 13/1

Recent advances in anti-fouling technology have made control of macroscopic fouling organisms (barnacles, bryozoans and tubeworms) feasible. Among the limiting factors in fast ship performance in the absence of macro-fouling are the hydrodynamic drag of hull coatings themselves, the drag increment caused by microbial fouling of hull coatings, and losses in propulsion efficiency resulting from microbial colonization of propellers. This work assesses the significance of microbial colonization of organic and metal surfaces for hydrodynamic drag over a wide range of flow velocities. Measurements made with a rotating disc apparatus at disc peripheral speeds from 9.5 to 33 Kn (17 to 61 Km/hr) showed that (a) microbial slime films can be grown which withstand testing at these velocities and (b) drag increments in excess of 10% are often observed. Therefore, because they are not eliminated by current anti-foulants, microbial fouling films and their effects on ship performance warrant serious consideration. Author (GRA)

N81-23788# Drexel Univ., Philadelphia, Pa. Dept. of Chemistry.

PHYSICAL AND CHEMICAL STUDIES OF CHLOROPHYLL IN MICROEMULSIONS

1980 14 p refs

(Contract DE-AS02-77ER-04452)

(DOE/ER-04452/3) Avail: NTIS HC A02/MF A01

Studies designed to provide fundamental information on both the nature of photoreactions in microemulsions and the utility of these media as solvents for absorbers of solar energy were conducted. As a test system, the photoreduction of absorbed dye (principally methyl red) sensitized by chlorophyll a in an anionic mineral oil in water microemulsion was investigated. Using ascorbate as the water soluble reducing agent and pigment concentrations of up to eight per drop (10mm), the reaction exhibits a pseudo zero order dependence on methyl red. The effect of sensitizer, ascorbate concentration and light intensity on the quantum yield was examined, as well as the effect of varying the microemulsion charge type, product catalysis, and the use of synthetic porphyrin sensitizers. DOE

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N81-23789# Wayne State Univ., Detroit, Mich. Bioengineering Center.

TOLERANCE OF THE HEAD AND NECK TO -G SUB x INERTIAL LOADING OF THE HEAD

Voight R. Hodgson 9 Mar. 1981 16 p refs

(Contract N00014-75-C-1015; NR Proj. 064-624)

(AD-A097632; TR-11) Avail: NTIS HC A02/MF A01 CSCL 06/19

The purpose of this investigation has been threefold: (1) to review the literature for experimental results which either contribute quantitative tolerance data or data supporting mechanisms or criteria of injury; (2) develop new methods of investigating neck response to indirect loading; (3) further refine a mathematical neck model. It has been found that retinal hemorrhage or mild concussion were the threshold injuries produced in forward facing harnessed individuals subjected to 39-45 g sled acceleration impulses lasting on the order of 0.270 ms depending on head-neck orientation. On the other hand, field collision data indicates insignificant head-neck injuries of belted passengers from purely inertial loading of the head due to collisions at highway automotive speeds. However, in abrupt neck stretch experiments with cats it has been found that neck stretch and possible odontoid process cord interaction are related to unconsciousness in this species. Tetanizing the cervical muscles reduced the incidence of 'concussion' symptoms produced in this animal. Collars on monkeys subjected to flexion producing occipital impacts, were reported to provide concussion protection. While no clear picture of tolerable levels or even criteria of injury can be pulled out of this array of evidence, it is clear that until the problem can be better defined, relative motion between head and neck and a position which will minimize stretch in the retinal attachments should be part of protective systems, where feasible, when abrupt -G(x) can be anticipated. GRA

N81-23790# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.

SEMICONDUCTOR DETECTORS FOR MEDICAL TOMOGRAPHY WITH HIGH-ENERGY HEAVY IONS

Jorge Llaner, Eugen E. Haller, William L. Hansen, John T. Walton, and Eleanor K. Batho Nov. 1980 7 p refs Presented at the IEEE Nucl. Sci. Symp., Orlando, Fla., 5-7 Nov. 1980

(Contract W-7405-eng-48)

(LBL-11037; CONF-801103-45) Avail: NTIS HC A02/MF A01

High-energy heavy ion beams are in use for cancer therapy. In order to take full advantage of the very favorable depth-dose characteristics of those beams, it is necessary to determine the stopping characteristics of the ions in the complex media of a human with greater accuracy than obtainable with X-ray CAT

scanning. Initial measurements with an array of Si dE/dx position sensitive detectors and a windowless thin planar Ge detector used in a side entry mode show the potential for fabricating an instrument for high accuracy on-line CAT scanning using the same ions to be used for therapy. It is estimated that one tomography can be obtained with a dose of 0.72 Rad-gm. DOE

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N81-23791*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF CURVED APPROACH PATHS AND ADVANCED DISPLAYS ON PILOT SCAN PATTERNS
Randall L. Harris, Sr. and Randolph W. Mixon Washington May 1981 29 p refs
(NASA-TP-1846; L-14229) Avail: NTIS HC A03/MF A01 CSCL 05I

The effect on pilot scan behavior of both advanced cockpit and advanced manuevers was assessed. A series of straight-in and curved landing approaches were performed in the Terminal Configured Vehicle (TCV) simulator. Two comparisons of pilot scan behavior were made: (1) pilot scan behavior for straight-in approaches compared with scan behavior previously obtained in a conventionally equipped simulator, and (2) pilot scan behavior for straight-in approaches compared with scan behavior for curved approaches. The results indicate very similar scanning patterns during the straight-in approaches in the conventional and advanced cockpits. However, for the curved approaches pilot attention shifted to the electronic horizontal situation display (moving map), and a new eye scan path appeared between the map and the airspeed indicator. The very high dwell percentage and dwell times on the electronic displays in the TCV simulator during the final portions of the approaches suggest that the electronic attitude direction indicator was well designed for these landing approaches. E.A.K.

N81-23792# Rice Univ., Houston, Tex. Dept. of Psychology.
UNCERTAINTY MEASUREMENT IN A COMPLEX TASK AS A FUNCTION OF RESPONSE MODE AND EVENT TYPE CHARACTERISTICS Technical Progress Report, 16 Apr. 1980 - 15 Jan. 1981
William C. Howell and Shanta P. Kerkar Feb. 1981 38 p refs
(Contract N00014-78-C-0555; NR Proj. 197-050)
(AD-A097678; TR-81-1) Avail: NTIS HC A03/MF A01 CSCL 05/10

This research was concerned with the hypothesized effect of response mode and event type factors on measured uncertainty for frequentistic events observed within a realistic task setting. Subjects served as dispatchers of emergency services for a hypothetical city on five daily shifts. Events were generated by a stationary stochastic process (emergency calls) or by the subject's responses to these calls (allocations and correct responses). At the conclusion of the 600 dispatching trials, subjects in the two experimental groups estimated either the frequency (FE) or probability (PE) of various kinds of events, and in a subsequent session, made predictive choices among selected event pairs. A control group (C) followed the same procedure except for omission of the estimation task. Results showed that estimation performance is influenced reliably by both variables: the FE group was superior to the PE group on all events, externally generated events produced generally better estimates than 'internal' ones, and spatial events were judged more accurately than non-spatial ones. Experimental groups made better choices than the control group, and there was a tendency for choice performance to reflect the quality of estimation performance. Author (GRA)

N81-23793# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
REFINEMENTS AND VALIDATION TESTING OF HUMAN OPERATOR PERFORMANCE EMULATOR (HOPE) Final Report
Esther Lee Davenport, Joanne Green, William E. Sears, III, and Harold F. Engler Mar. 1981 140 p refs
(Contract F33615-77-C-0042; AF Proj. 2313)
(AD-A097449; AFHRL-TR-81-5) Avail: NTIS HC A07/MF A01 CSCL 05/9

This report is the second of two major technical reports describing the development and testing of a computer simulation of manual control behavior. The simulation is called the Human Operator Performance Emulator (HOPE) and is unique in at least three respects. First, the simulation contains representations of structures and processes believed important in continuous control behavior, and thus has a degree of psychological validity not characteristic of other models of the same behavior. Second, the simulation models the learning of control behavior, and thus models behavior of both trained and untrained operators. Third, and probably most importantly, the simulation includes representation of a construct called control strategy, and was designed to measure control strategy in humans. GRA

N81-23794# Air Force Academy, Colo. Frank J. Seiler Research Lab.
EFFECTS OF CRITERIA ON FLIGHT SIMULATION. STUDY 2: MULTIPLE CRITERIA Final Report, Jan. - Dec. 1980
Mark Nataupsky, Thomas M. McCloy, John M. Bermudez (East Oklahoma State Univ.), and Valentin W. Tirman Dec. 1980 18 p refs
(AF Proj. 2303)
(AD-A097526; FJSRL-TR-80-0020) Avail: NTIS HC A02/MF A01 CSCL 05/9

Recent studies have shown that criterion levels established in training directly affect later performance of subjects on experimental tasks. Approximately 20% of variance can be explained by these criteria. The purpose of this study was to determine if a similar relationship can be found in transfer of training situations. Twenty male Air Force Academy cadets were trained to one of two multiple criteria levels on a difficult flight maneuver in a GAT-1 simulator. There was an easy criterion set and a more difficult criterion set. These two sets consisted of holding prescribed performance parameters in heading, vertical velocity, and altitude. After achieving their assigned criterion, all cadets in each of the two groups were then tested on the same task in GAT-1 simulator, but this time the maneuver had to be performed under turbulent wind conditions. This wind condition served as the transfer task. Half of the cadets in each group had the same criterion in both the training and the transfer task. The other cadets had different criteria in the training and transfer tasks. Author (GRA)

N81-23795# Illinois Univ., Champaign. Cognitive Psychophysiology Lab.
APPLICATIONS OF EVENT-RELATED BRAIN POTENTIALS IN HUMAN ENGINEERING Annual Progress Report
Emanuel Donchin, Christopher D. Wickens, and Richard L. Horst Nov. 1980 94 p refs
(Contract F49620-79-C-0233; AF Proj. 2313)
(AD-A097542; CPL80-1/AFO-App; SR8-1-App; AFOSR-81-0306TR) Avail: NTIS HC A05/MF A01 CSCL 05/9

Contents: The Event-Related Brain Potential as an Index of Attention Allocation in Complex Displays; Event-Related Brain Potentials and Subjective Probability in a Learning Task; and A Metric for Thought: A Comparison of P300 Latency and Reaction Time. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N81-23796 Ohio State Univ., Columbus.
TERMS AND AXIOMS FOR A THEORY OF HUMAN-MACHINE SYSTEMS Ph.D. Thesis
Kenneth Harding Funk, II 1980 191 p

Avail: Univ. Microfilms Order No. 8107323

A structure incorporating a number of formally defined terms and axioms is developed to aid in organizing knowledge about human-machine systems such as aircraft/aircrew systems, command, control, and communications systems, and process control systems. To provide perspective, the relationships between languages, theories, and models are investigated. A formal, set-theoretical approach is used to define a collection of key terms and state several axioms which allow the description of a human-machine system as a set of parallel procedures, coordinated by a central executive procedure, governing the operation of other subsystems. A simple illustration is presented and a number of issues and implications raised by the structure are explored. Dissert. Abstr.

N81-23797 Wisconsin Univ. - Madison.

A MOTION CYCLE SIMULATOR FOR ANALYSIS AND OPTIMIZATION OF HUMAN POWER Ph.D. Thesis

Craig Jack Cornelius 1980 190 p

Avail: Univ. Microfilms Order No. 8105267

A novel motion cycle simulator is described which can be effectively used to investigate human dynamics and power generation. The system is capable of producing a multitude of motion patterns at different body postures and monitoring all the significant mechanical and physiological data. The versatility of the apparatus makes it suitable for producing simple as well as complex trajectories for optimizing transient as well as steady state power generation. Although only aerobic pedaling in supine posture was considered, results demonstrated that the optimal efficiency occurred in conditions where the velocity of the pedal and the applied force on it are as uniform as possible and in phase. Besides providing a versatile tool for studies on human power generation, the setup can also be used as a training device for athletes and for physical therapy where the load on a given group of muscles can be exercised by the appropriate selection of the operator's posture and petal trajectory. Dissert. Abstr.

N81-23798*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PRELIMINARY STUDY OF HEAD-UP ASSESSMENT TECHNIQUES. 1: VIEWING DURATION OF INSTRUMENT PANEL AND HUD SYMBOLOGY USING A RECALL METHODOLOGY

Richard F. Haines Aug. 1978 27 p refs

(NASA-TM-78517; A-7589) Avail: NTIS HC A03/MF A01 CSCL 05H

Eight commercial pilots were shown 50 colored, high fidelity slides of a standard instrument panel (IP) with the needle positions of each instrument varying from slide to slide and then 50 slides of a head-up display (HUD) symbology format which contained an equivalent amount of flight-related information as the instrument panel slides. All stimuli were presented under controlled, static viewing conditions that allowed the measurement of the speed and accuracy with which one randomly selected flight parameter on each slide could be read. The subject did not know which parameter would be requested and, therefore, had to remember the total set of information in order to answer the question correctly. The results showed that from 6.6 - 8.7 sec total viewing time was required to correctly extract altitude, airspeed, heading, VSI, or ADI from the IP slides and from 6.1 to 7.4 sec for the HUD slides. T.M.

N81-23799*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A PRELIMINARY STUDY OF HEAD-UP DISPLAY ASSESSMENT TECHNIQUES. 2: HUD SYMBOLOGY AND PANEL INFORMATION SEARCH TIME

Joseph G. Guercio and Richard F. Haines Oct. 1978 25 p refs

(Grant NsG-2269)

(NASA-TM-78536; A-7706) Avail: NTIS HC A02/MF A01 CSCL 05H

Twelve commercial pilots were shown 50 high-fidelity slides of a standard aircraft instrument panel with the airspeed, altitude, ADI, VSI, and RMI needles in various realistic orientations. Fifty slides showing an integrated head-up display (HUD) symbology containing an equivalent number of flight parameters as above (with flight path replacing VSI) were also shown. Each subject was told what flight parameter to search for just before each slide was exposed and was given as long as needed (12 sec maximum) to respond by verbalizing the parameter's displayed value. The results for the 100-percent correct data indicated that: there was no significant difference in mean reaction time (averaged across all five flight parameters) between the instrument panel and HUD slides; and a statistically significant difference in mean reaction time was found in responding to different flight parameters. T.M.

N81-23800*# Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.

EVALUATION OF ENGINEERED FOODS FOR CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS) Interim Report, 1 Dec. 1979 - 31 Jan. 1981

Marcus Karel 1981 19 p refs

(Contract NAS9-16008)

(NASA-CR-160952) Avail: NTIS HC A02/MF A01 CSCL 06H

A system of conversion of locally regenerated raw materials and of resupplied freeze-dried foods and ingredients into acceptable, safe and nutritious engineered foods is proposed. The first phase of the proposed research has the following objectives: (1) evaluation of feasibility of developing acceptable and reliable engineered foods from a limited selection of plants, supplemented by microbially produced nutrients and a minimum of dehydrated nutrient sources (especially those of animal origin); (2) evaluation of research tasks and specifications of research projects to adapt present technology and food science to expected space conditions (in particular, problems arising from unusual gravity conditions, problems of limited size and the isolation of the food production system, and the opportunities of space conditions are considered); (3) development of scenarios of agricultural production of plant and microbial systems, including the specifications of processing wastes to be recycled. S.F.

N81-23801# Applied Psychological Services, Wayne, Pa. Science Center.

COMPUTER SIMULATION OF HUMAN PERFORMANCE IN ELECTRONIC PROCESSED IMAGERY SYSTEMS Final Report

Arthur I. Siegel and Robert F. Bachert (AFAMRL, Wright-Patterson AFB) Jan. 1981 125 p refs

(Contract F33615-77-C-0520; AF Proj. 7184)

(AD-A097622; AFAMRL-TR-79-117) Avail: NTIS HC A06/MF A01 CSCL 09/2

The psychological, analytic, and programmatic aspects for an integrated set of computer simulation subroutines are presented. The algorithms and modules were designed to add the realism of a human element to MAIN network systems simulation model of the AN/UPD-X systems exploitation process. This process involves a multi-operator, multi-stage exploitation of targeting information gathered by an airborne side-looking reconnaissance aircraft. The design of generic modules was a primary goal. The theoretical basis in the behavioral sciences is presented, cast into quantitative terms, and formulation as programming specifications. Author (GRA)

N81-23802# Boeing Aerospace Co., Seattle, Wash. Logistics Support and Services Div.

INSTRUCTOR/OPERATOR DISPLAY EVALUATION METHODS Final Report

Charles Elworth Mar. 1981 191 p refs

(Contracts F33615-77-C-0017; F33615-78-C-0051; AF Proj. 6114)

(AD-A097208; AFHRL-TR-79-41) Avail: NTIS HC A09/MF A01 CSCL 05/9

The purpose of this study was to develop an objective, systematic technique for evaluating alternative formats for the displays to be used at the instructor/operator station (IOS) of a flight simulator. A benchmark performance monitoring task was designed which exercises many of the skills used by an instructor at remote IOS. Measurement techniques were developed for assessing performance of the task. The techniques were demonstrated by using them to compare two popular display formats: digital readouts versus repeater instruments. Three of six variables were monitored with greater accuracy and compre-

hensiveness using repeater instruments than digital readouts. For the other three variables, there was no difference between display types. Significant effects were caused by both the type of maneuver being flown and the type question being asked in administering the measurement method. We concluded that the benchmark task approach has considerable merit as a method of evaluating display formats. In follow-on studies, additional investigations should be conducted on the specifics of the measurement technique and the possible effects of memory on results. Author (GRA)

N81-23803# Systems Research Labs., Inc., Dayton, Ohio.
A HUMAN OPERATOR GUNNER MODEL FOR A TRACKING TASK WITH INTERRUPTED OBSERVATIONS IN AN ANTIAIRCRAFT ARTILLERY SYSTEM
Chen-Fu Yu Mar. 1981 61 p refs
(Contract F33615-79-C-0500; AF Proj. 6893)
(AD-A097360; AFAMRL-TR-81-37) Avail: NTIS HC A04/MF A01 CSCL 05/1

This report describes the development of a mathematical model (blanking model) for a human operator's tracking performance under visual interruptions via blanking the target in a simulated manned antiaircraft artillery system. The basic ideas of the Luenberger observer theory are extended to develop an observer model with time-varying gains. The model consists of a reduced-order observer, a feedback controller, and two noise components. The blanking model is then obtained from the general model under an exponential-gain assumption. Four blanking time constants associated with the exponential gains are introduced to relate to the human operator's short-term memory. The parameters of the model are identified from a curve-fitting computer program. Model predictions of both azimuth and elevation tracking errors for several flyby and maneuvering trajectories are shown to be in excellent agreement with the empirical data obtained from the blanking experiments. It is concluded that the blanking model developed in this report is a predictive model for a gunner's tracking performance with interrupted observations. GRA

N81-23804# Michigan Univ., Ann Arbor. Highway Safety Research Inst.
SIMULATION ANALYSIS OF HEAD/NECK IMPACT RESPONSE FOR HELMETED AND UNHELMETED MOTORCYCLISTS Final Report, 22 May 1978 - 18 Apr. 1980
Bruce M. Bowman and Lawrence W. Schneider 18 Apr. 1980 410 p refs Sponsored in part by Insurance Inst. for Highway Safety, Washington, D.C.
(PB81-145377; UMICH-HSRI-80-26) Avail: NTIS HC A18/MF A01 CSCL 06Q

Computer simulations were used to determine both quantitative and qualitative measures of the effectiveness of motorcycle helmets in reducing head and neck injuries in motorcyclist impacts. A wide variety of impact conditions were investigated in order to establish a broad overall view of the effectiveness of helmet use. It was found that helmet use invariably lessens the exposure levels of dynamic responses which have a role in producing head injury. In addition, helmet use was found to almost always reduce the severity of neck response as well and for no simulation configuration or condition to greatly increase the likelihood of neck injury. L.F.M.

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N81-23805# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.
RESEARCH ON PARALLELISM IN PROBLEM-SOLVING SYSTEMS Annual Technical Report
David E. Wilkins 30 Sep. 1980 14 p refs
(Contract F49620-79-C-0188)
(AD-A097608; AFOSR-80-1150TR; ATR-1) Avail: NTIS HC A02/MF A01 CSCL 12/2

This report summarizes the first year of research on a system for automatically generating hierarchical plans containing parallel (concurrent) actions. This is a general planning and problem-solving system that is not tied to a particular domain. Results of this research might eventually be used in the development of systems for automatically generating plans to coordinate the activities of military personnel engaged in a common mission. Other domains of application could include logistical planning, planning to use many computers on a network concurrently, and planning to prepare and disseminate a report or other information to a large group of people. General-purpose problem-solving systems elicited wide interest in the early and mid-1970s, and Sacerdoti's NOAH was one of the most important general planners produced. Some of the results of the new design appeared in a technical publication which is reproduced in the Appendix. GRA

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N81-23806# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.
A STUDY OF INTEGRATED SWITCHING TECHNIQUES Final Report, 1 Jan. - 31 Dec. 1980
Pramod K. Varshney, K. Sriram, and J. George Shanthikumar Feb. 1981 51 p refs
(Grant AF-AFOSR-0074-80; AF Proj. 2304)
(AD-A097243; AFOSR-81-0312TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

In this research, an analytical study of integrated switching techniques was performed. Two problems were considered. First, the modeling and analysis of integrated multiplexing of voice and data was considered. Two discrete-time queueing models were developed. Since the amount of computational effort required to obtain numerical results is large, approximations to the models were also considered. Secondly, a flow control scheme for a movable boundary integrated voice-data multiplexer was considered. In this scheme, a decision rule based on the data queue length is employed to cutoff the priority of voice to prevent a data queue buildup. A continuous-time queueing model was developed and the performance of the flow control scheme was obtained using an efficient computational procedure. Author (GRA)

N81-23807# Naval Postgraduate School, Monterey, Calif.
USE OF THE TI 59 WITH APPLICATIONS TO PROBABILITY AND STATISTICAL ANALYSIS M.S. Thesis
George Russell Nelson and Edgar Emmett Stanton, III Dec. 1980 162 p refs
(AD-A097384) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis demonstrates through three comprehensive examples, the capabilities of the TI 59 programmable hand-held calculator as an analytical tool. One example is a probability application while the other two examples entail use of the TI 59 in statistical inference and data analysis. The probability example involves the use of the Monte Carlo technique to simulate

stochastically the detection, identification and engagement of a cruise missile by an Improved Hawk Air Defense Battery. The second example illustrates a TI 59 program which is designed to analyze sample data. The data used for this illustration were gathered by the authors in an experiment which encompassed the testing of thirty-six male subjects to determine the extent to which their training routines influenced their strength, endurance, and cardiovascular fitness. The third example involves the use of an ANOVA routine and Scheffe's multiple contrasts to demonstrate how the TI 59 may be used to facilitate statistical inferences. The fitness data are also used for this purpose. The intent throughout the thesis is to exemplify the capabilities of the TI 59 as a viable, real world analytical tool rather than emphasize particular results of the simulation or the experiment. Author (GRA)

N81-23808# Maryland Univ., College Park. Dept. of Computer Science.

APPLICATIVE SPECIFICATIONS OF DISTRIBUTED SYSTEMS: EXTENDING THEM TO EMBEDDED SYSTEMS Interim Technical Report

Pamela Zave Mar. 1981 32 p refs

(Grant AF-AFOSR-3181-77; AF Proj. 2304)

(AD-A097280; AFOSR-81-0314TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

Recent extensions to applicative languages have made it possible to use them, with their numerous theoretical and practical advantages, for specifying the requirements and designs of distributed systems. Embedded systems are an increasingly important class of distributed systems, and have special problems not adequately dealt with by existing applicative languages. This paper proposes further extensions, shows how they are used to specify embedded systems, and discusses the ramifications of these extensions on the fundamental assumptions of applicative programming. Author (GRA)

N81-23809# Maryland Univ., College Park. Dept. of Computer Science.

EVALUATING A DATA ABSTRACTION TESTING SYSTEM BASED ON FORMAL SPECIFICATIONS Interim Report

Paul R. McMullin and John D. Gannon Dec. 1980 32 p refs

(Contract F49620-80-C-0001; AF Proj. 2304)

(AD-A097231; AFOSR-81-0264TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

A compiler-based specification and testing system for defining data types has been developed. The system, DAISTS, includes formal algebraic specifications and statement and expression test coverage monitors. This paper describes our initial attempt to evaluate the effectiveness of the system in helping users produce software containing fewer errors. In an exploratory study, subjects without prior experience with DAISTS were encouraged by the system to develop effective sets of test cases for their implementations. Furthermore, an analysis of the errors remaining in the implementations provided valuable hints about additional useful testing metrics. Author (GRA)

N81-23810# Mississippi State Univ., Mississippi State. State Engineering Industrial Research Station.

A STUDY OF AVIONICS TIME DIVISION MULTIPLEX BUS SIMULATION Final Report, 1 Jan. - 31 Dec. 1980

Malcolm D. Calhoun and Behrooz Khartirzad Dec. 1980 169 p refs

(Grant AF-AFOSR-0126-80; AF Proj. 2304)

(AD-A097375; MSSU-EIRS-EE-81-1; AFOSR-81-0311TR) Avail: NTIS HC A08/MF A01 CSCL 09/2

The multiplex data bus system is a collection of electronic devices which send or receive signals for encoding and/or decoding; also, the system is capable of storing for future dispersal messages which arrive simultaneously. The components of the multiplex system are: (1) the bus controller, (2) remote terminals, (3) subsystems which may have embedded remote terminals, and (4) the data bus. An overview of several current simulation languages is presented in Chapter 2. In Chapter 3, the general views of MUXSIM and the analysis of the dynamic part of the MUXSIM system are described in detail. The purpose of the dynamic MUXSIM (MUXDA and MUXDB) is to model the time-variant or stochastic aspects of the system and to obtain the simulation results on such system parameters as queue size, time delay, system failure, etc. In Chapter 4, a programming example of a single queue, single bus is presented in FORTRAN IV, and three different simulation languages, (GASP IV, SIMSCRIPT II, and GPSS II). Chapter 5 is a comparative study of the simulation languages based on the results of Chapter 4. Recommendations regarding the choice of a language for multiplex simulation are included. GRA

N81-23811# Sandia Labs., Albuquerque, N. Mex.

CDC/1000: A CONTROL DATA CORPORATION REMOTE BATCH TERMINAL EMULATOR FOR HEWLETT-PACKARD MINICOMPUTERS

Dale E. Berg Feb. 1981 377 p refs

(Contract DE-AC04-76DP-00789)

(SAND-80-2548) Avail: NTIS HC A17/MF A01

CSC/1000, a software subsystem that implements a communications protocol on Hewlett-Packard minicomputers running the Real Time Executive III, IV, or IVB operating systems, is discussed. The various software modules comprising CDC/1000 are described. Instructions for integrating CDC/1000 into the Hewlett-Packard operating system and for operating the user interface program are given. DOE

N81-23023# European Space Agency, Paris (France).

PROCESSING OF AIDS FLIGHT RECORDER DATA FOR A QUICK LOOK WITH THE AID OF A HYBRID COMPUTER SYSTEM

H. Hoffman *In its* Contrib. to the 9th Symp. on Aircraft Integrated Data Systems (ESA-TT-532) Feb. 1981 p 355-370 Transl. into ENGLISH of "Beitrage zum 9 Symp. Bordintergrierte Flugdatensysteme" (Brunswick) DFVLR-Mitt-79-03, Feb. 1979 p 345-362 (For primary document see N81-23008 14-01)

Avail: NTIS HC A16/MF A01

N81-24010*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.

OPTIMUM DESIGN OF HYBRID PHASE LOCKED LOOPS

P. Lee and T. Yan *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 87-95 refs (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 09B

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N81-23812*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.

AN ALGORITHM FOR THE RAPID LOCATION OF AN EXTREME OF A FUNCTION SUBJECT ONLY TO GEOMETRIC RESTRICTIONS

George R. Terrell Jan. 1981 7 p

(Contract NAS9-15800)

(NASA-CR-160940; JSC-17061; LEMSCO-15991) Avail: NTIS HC A02/MF A01 CSCL 09B

The requirements of symmetry and convexity in the application of algorithms for the minimization or maximization of a function are discussed. It is arugued that if a function of a single variable is convex and symmetric in a neighborhood of an extremum, the extremum may be approximated to the precision that increases by at least a power of two per functional evaluation. The procedure may be used to drive a complex optimization procedure in the multivariate area estimation problem encountered in remote sensing. E.A.K.

N81-23813*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A GENERAL ALGORITHM FOR THE CONSTRUCTION OF CONTOUR PLOTS

Wayne Johnson and Fred Silva (Informatics, Inc., Palo Alto, Calif.) Apr. 1981 107 p

(NASA-TM-81287; A-8560; AVRADCOM-TR-81-A-9) Avail: NTIS HC A06/MF A01 CSCL 12A

An algorithm is described that performs the task of drawing

equal level contours on a plane, which requires interpolation in two dimensions based on data prescribed at points distributed irregularly over the plane. The approach is described in detail. The computer program that implements the algorithm is documented and listed. Author

N81-23814*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEEP SPACE NETWORK SOFTWARE COST ESTIMATION MODEL
Robert C. Tausworthe 15 Apr. 1981 50 p refs
(Contract NAS7-100)
(NASA-CR-164277; JPL-Pub-81-7) Avail: NTIS HC A03/MF A01 CSCL 09B

A parametric software cost estimation model prepared for Jet Propulsion Laboratory (JPL) Deep Space Network (DSN) Data System implementation tasks is described. The resource estimation mdel modifies and combines a number of existing models. The model calibrates the task magnitude and difficulty, development environment, and software technology effects through prompted responses to a set of approximately 50 questions. Parameters in the model are adjusted to fit JPL software life-cycle statistics. S.F.

N81-23815# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
PROCEDURAL SEMANTICS AS A THEORY OF MEANING
W. A. Woods Mar. 1981 61 p refs Submitted for publication
(Contracts N00014-77-C-0371; N00014-77-C-0378)
(AD-A097630; BBN-4627) Avail: NTIS HC A04/MF A01 CSCL 05/7

This report addresses fundamental issues of semantics for computational systems. The question at issue is 'What is it that machines can have that would correspond to the knowledge of meanings that people have and that we seem to refer to by the ordinary language term 'meaning'?' The proposed answer is that the notion of truth-conditions can be explicated and made precise by identifying them with a particular kind of abstract procedure and that such procedures can serve as the meaning bearing elements of a theory of semantics suitable for computer implementation. This theory, referred to as 'procedural semantics', has been the basis of several successful computerized systems and is acquiring increasing interest among philosophers of language. Author (GRA)

N81-23816# Mitre Corp., Bedford, Mass.
CCD MULTI-LEVEL LOGIC Interim Report, Oct. 1978 - Dec. 1979
D. O. Carhoun and S. M. Waldstein Mar. 1981 75 p refs
(Contract F19628-80-C-0001; AF Proj. 6440)
(AD-A097586; MTR-8122; ESD-TR-81-120) Avail: NTIS HC A04/MF A01 CSCL 09/2

An interim technical report on Project 6440, CCD multi-level logic documents activities and interim results midway through the project. The report is divided into two principal sections covering (a) analysis and measurements of the practical limitations of CCD multi-level digital operation and (b) ideas and potential techniques for signal-processing applications. Author (GRA)

N81-23817# Stanford Univ., Calif. Dept. of Operations Research.
BINARY INTEGER LINEAR PROGRAMMING: A HYBRID IMPLICIT ENUMERATION APPROACH
Nancy Eileen Jacqmin Dec. 1980 110 p refs
(Contract N00014-76-C-0418; Grant NSF MCS-76-81259; NR Proj. 047-061)
(AD-A097108; TR-97; TR-80-30) Avail: NTIS HC A06/MF A01 CSCL 12/1

This report develops a hybrid algorithm to solve the binary integer linear programming problem. This problem involves optimizing a linear objective function subject to a set of linear inequalities where, in addition, we require the variables to take on the value 0 or 1. the approach developed is that of implicit enumeration; that is, the set of all possible binary combinations of values for the variables is searched without considering each combination explicitly. This is accomplished by applying a series of tests which when satisfied allow immediate elimination of large subsets of these completions. It is in the choice of tests to be used that this algorithm may be termed a hybrid. Borrowing penalties and pseudocosts as well as binary infeasibility and conditional binary infeasibility tests from previous approaches, the algorithm is built to use each of their strengths. In addition, an existing heuristic procedure is used to generate a good feasible binary point at the outset. Thus, a good initial bound on the optimal function value is available. Author (GRA)

N81-23818# Teledyne Brown Engineering, Huntsville, Ala. Systems Div.
SOFTWARE PARTITIONING SCHEMES FOR ADVANCED SIMULATION COMPUTER SYSTEMS, PART 1 Final Report
S. J. Clymer Feb. 1981 152 p
(Contract F33615-78-C-0013; AF Proj. 6114)
(AD-A096187; AFHRL-TR-80-42-Pt-1) Avail: NTIS HC A08/MF A01 CSCL 09/2

The overall objective of this study was to design software partitioning techniques that can be used by the Air Force to partition a large flight simulator program for optimal execution on alternative configurations. The results were a mathematical model which defines characteristics for an optimal partition and a manually demonstrated partitioning algorithm design which implements heuristic controls based on the mathematical model statement. GRA

N81-23819# Naval Postgraduate School, Monterey, Calif.
AN ADAPTATION OF THE ADA LANGUAGE FOR MACHINE GENERATED COMPILERS M.S. Thesis
Mark Allen Rogers and Linda Mary Myers Dec. 1980 208 p refs
(AD-A097292) Avail: NTIS HC A10/MF A01 CSCL 09/2

The ADA language has been designated by the Department of Defense to replace the computer languages currently in use by the various services for tactical computer programs. This thesis modifies the Cornell Subset of ADA so that it is suitable for producing the LALR(1) grammar. Machine generated compiling tools such as LEX and YACC, available under the UNIX operating system, are then used to implement the scanner and the parser for this subset of ADA. Author (GRA)

N81-23820# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF SEVERAL BRANCHING FUNCTIONS IN A BRANCH AND BOUND ALGORITHM FOR THE CHROMATIC NUMBER PROBLEM M.S. Thesis
Ronald Ernest Rautenberg Dec. 1980 126 p refs
(AD-A097330) Avail: NTIS HC A07/MF A01 CSCL 09/2

The chromatic number problem is to determine the minimum number of colors to assign to the vertices of a graph such that no connected vertices are assigned the same color. This paper presents a branch and bound solution to the chromatic number problem and investigates five different branching functions. Additionally, a method of coloring very sparse graphs is presented which divides a graph into biconnected components and reduces the time required to color the graph. Author (GRA)

N81-23821# Maryland Univ., College Park. Dept. of Computer Science.
SOFTWARE REQUIREMENTS: A REPORT ON THE STATE OF THE ART Interim Technical Report
Raymond T. Yeh, Pamela Zave, Alex Paul Conn, and George E. Cole, Jr. Oct. 1980 57 p refs
(Grant AF-AFOSR-3181-77; AF Proj. 2304)
(AD-A097278; AFOSR-81-0320TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

Many problems arising during the development and evolution of large computer systems can be alleviated by thorough and timely attention to requirements. This paper surveys recent research on requirements technology which the authors consider to promise substantial improvements over the analysis and specification techniques that are now commonly known and used. All aspects of requirements are considered, and points are illustrated using the requirements document of an early, but ambitious, real-time system. Author (GRA)

N81-23822# University of Southeastern Massachusetts, North Dartmouth. Dept. of Electrical Engineering.

NOTE ON COMPUTER GRAPHICS FOR MAXIMUM ENTROPY SPECTRAL ANALYSIS
C. H. Chen and Chihsung Yen 23 Mar. 1981 16 p refs
(Grant AF-AFOSR-0143-80)
(AD-A097121; SMU-EE-TR-81-7) Avail: NTIS HC A02/MF A01 CSCL 09/2

Computer graphics provides an effective three dimensional display of power spectral density for varying parameters. Based on the software we have developed, the computer-graphics display is presented for Burg's maximum entropy spectral analysis and Fougere's (nonlinear) maximum entropy spectral analysis. The significantly greater dynamic range of the Fougere's spectrum clearly illustrates the superiority of the Fougere's method. The graphics software listing is provided in the Appendix of the report. Author (GRA)

N81-23823# Los Alamos Scientific Lab., N. Mex.
DECISION GRAPHS: A TOOL FOR DEVELOPING REAL TIME SOFTWARE
Andrew J. Kozubal 1981 7 p refs Presented at the 2nd Intern. Conf. and Exhibition on Eng. Software, London, 24-26 Mar. 1981
(Contract W-7405-eng-36)
(LA-UR-80-3502) Avail: NTIS HC A02/MF A01

The use of decision graphs in the preparation of, in particular, real-time software is briefly described. The usefulness of decision graphs in software design, testing, and maintenance is pointed out. DOE

N81-24014*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
A DECODING FAILURE TEST FOR THE TRANSFORM DECODER OF REED-SOLOMON CODE
R. L. Miller, T. K. Truong, and I. S. Reed (Univ. of Southern California, Pasadena) *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 121-124 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N81-23131# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
COMPUTER NETWORKING EXPERIMENT VIA THE SYMPHONIE SATELLITE [RECHNERVERBUNDEXPERIMENT UEBER DEN SATILLITEN SYMPHONIE]
R. Lang and K. Simon (IBM, Stuttgart) *In* CNES Symphonie Symp. 1980 p 391-413 refs In GERMAN; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support*.

N81-23824# Yale Univ., New Haven, Conn. Systems and Information Sciences Dept.
BOUNDED ERROR ADAPTIVE CONTROL, PART 1
Benjamin B. Peterson and Kumpati S. Narendra Dec. 1980 31 p refs
(Contract N00014-76-C-0017)
(AD-A097628; S/IS-8005-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 12/1

Adaptive identification and control problems when the output error between plant and model cannot be made to tend to zero are discussed. These include cases when the plant output is corrupted with noise and when plant parameters vary with time. The principal aim is to determine adaptive laws so that all the signals in the overall system are bounded. It is first shown that an error model can be derived which is described by a non-homogeneous differential equation. If the external disturbance, plant parameter variations, and input are bounded and the input is sufficiently rich the parameter error vector is bounded and explicit bounds are presented. If the input is not sufficiently rich, conditions for boundedness and unboundedness of the parameter error vector are derived and examples of unstable systems are given. Finally, for the control problem where the input cannot be assumed to be bounded, a nonlinear adaptation algorithm is suggested. The need for such an algorithm is shown by considering simple systems in which the parameter error almost always becomes unbounded if the disturbance does not tend to zero. By adjusting the parameters of the algorithm it is shown that the boundedness of all the signals in the system can be assured. The method can be extended to more general adaptive control problems which will be considered in greater detail in a subsequent report. Author (GRA)

N81-23825# Systems Technology, Inc., Hawthorne, Calif.
MULTI-RATE DIGITAL CONTROL SYSTEMS WITH SIMULATION APPLICATIONS. VOLUME 1: TECHNICAL REPORT Final Report, Jan. 1979 - May 1980
Richard F. Whitbeck and Dennis G. J. Didaleusky (Air Force Systems Command, Wright-Patterson AFB, Ohio) Sep. 1980 147 p refs
(Contract F33615-79-C-3601; AF Proj. 2304)
(AD-A097549; STI-TR-1142-1-1-Vol-1; AFWAL-TR-80-3101-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 09/2

The objective of this research effort is to develop a multi-rate/multiple-order theory for the design of closed-loop digital control systems with characteristics and attributes that are either difficult or impossible to attain with analog or single-rate controllers. The key idea in this methodology is to use the logic of the computer to take a scalar continuous output signal, sample it at a relatively high rate, and then sort out the sample into a vector of pseudo measurements. The potential of such a scheme is significant, since it offers, among other things, the possibility of using fewer sensors and the potential for providing gracefully degrading system performance in the face of sensor failure. The report is organized in three volumes. Volume I contains the theoretical developments as well as illustrative examples and case studies. The basic tools needed to assess the pseudo measurement concept are reviewed and extended. The concept of the frequency response of the continuous variables of a single-rate digitally controlled system is then given sufficient generality to treat multirate systems (including the pseudo measurement concept). A YF-16 case study is used to compare psuedo measurement gains against conventional YF-16 analog controller gains. The pseudo measurement gains are found to be comparable with the conventional gains, indicating the approach does not require control authority more excessive than an analog controller design. GRA

N81-23826# Systems Technology, Inc., Hawthorne, Calif.
MULTI-RATE DIGITAL CONTROL SYSTEMS WITH SIMULATION APPLICATIONS. VOLUME 2: COMPUTER ALGORITHMS Final Report, 29 Jan. 1979 - 29 May 1980
Richard F. Whitbeck and Dennis G. J. Didaleusky (Air Force Systems Command, Wright-Patterson AFB, Ohio) Sep. 1980 122 p refs
(Contract F33615-79-C-3601; AF Proj. 2314)
(AD-A097550; STI-TR-1142-1-2-Vol-2; AFWAL-TR-80-3101-Vol-2) Avail: NTIS HC A06/MF A01 CSCL 09/2

The report is organized in three volumes. The two computer programs presented in Volume II provide some of the basic digital implementation tools required in the analysis and synthesis of hybrid systems. The DISCRET computer program converts a general analog or continuous model expressed in the s-plane to the z-, w-, or w'-plane. DISCRET can calculate the standard, delayed, or advanced discrete transform. Data holds including the zero order, first order, second order, and slewer can be inserted into the transformation. The second program, TXCONV, implements the conversion of a high-rate discrete transform to a low-rate discrete transform. Detailed descriptions of the DISCRET and TXCONV computer programs are provided. This includes the available program options, theoretical basis for the

mechanization algorithms, general and detailed program structure, required input data, and typical program output. GRA

N81-23827# North Carolina Univ. at Chapel Hill. Inst. of Statistics.
DISTANCES OF RANDOM VARIABLES AND POINT PROCESSES
D. J. Daley (Australian National Univ., Canberra) Mar. 1981 25 p refs
(Contract N00014-75-C-0809)
(AD-A097621; MIMEO-SER-1331) Avail: NTIS HC A02/MF A01 CSCL 12/1

The paper is basically a discussion and survey of some literature concerning the concept of a distance function for random variables and point processes. Work of Kalzanov on the closeness of renewal processes to Poisson processes is outlined, and there are comments on various possible comparison methods for point processes as given by Whitt. Author (GRA)

N81-23828# California Univ., Berkeley. Center for Applied Mathematics.
CONTROLLABILITY FOR DISTRIBUTED BILINEAR SYSTEMS
J. M. Ball (Heriot-Watt Univ.), J. E. Marsden, and M. Slemrod (Rensselaer Polytechnic Inst.) Mar. 1981 64 p refs
(Contract DAAG29-79-C-0086; Grants NSF MSC-78-06718; NSF MCS-79-02773)
(AD-A097411; PAM-32; TR-11; ARO-16567.7-M) Avail: NTIS HC A04/MF A01 CSCL 12/1

It is proved that one can control an infinite dimensional distributed bilinear system to a dense subset of state space and that full state control is impossible. An abstract theory is established and is shown to apply to the rod equation with hinged ends under an axial load as the control. Author (GRA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N81-23829*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
PROPERTIES OF MULTIVARIABLE ROOT LOCI M.S. Thesis
Andrew Emil Yagle Jun. 1981 128 p refs
(Grant NGL-22-009-124)
(NASA-CR-164319; LIDS-TH-1090) Avail: NTIS HC A07/MF A01 CSCL 12A

Various properties of multivariable root loci are analyzed from a frequency domain point of view by using the technique of Newton polygons, and some generalizations of the SISO root locus rules to the multivariable case are pointed out. The behavior of the angles of arrival and departure is related to the Smith-MacMillan form of G(s) and explicit equations for these angles are obtained. After specializing to first order and a restricted class of higher order poles and zeros, some simple equations for these angles that are direct generalizations of the SISO equations are found. The unusual behavior of root loci on the real axis at branch points is studied. The SISO root locus rules for break-in and break-out points are shown to generalize directly to the multivariable case. Some methods for computing both types of points are presented. Author

N81-23830# Stanford Univ., Calif. Systems Optimization Lab.
QP-BASED METHODS FOR LARGE-SCALE NONLINEARLY CONSTRAINED OPTIMIZATION
Philip E. Gill, Walter Murray, Michael A. Saunders, and Margaret H. Wright Jan. 1981 27 p refs Presented at the Nonlinear Programming 4 Symp., Madison, Wis., Jul. 1980
(Contracts N00014-75-C-0267; DAAG29-79C-0110; DE-AC03-76SF-00326; DE-AT03-76EP-72018; Grants NSF MCS-79-26009; NSF ECS-80-12974; NR Proj. 047-143)
(AD-A097407; SOL-81-1; ARO-16470.15-M) Avail: NTIS HC A03/MF A01 CSCL 12/1

Several methods for nonlinearly constrained optimization have been suggested in recent years that are based on solving a quadratic programming (QP) subproblem to determine the direction of search. Even for dense problems, there is no consensus at present concerning the 'best' formulation of the QP subproblem. When solving large problems, many of the options possible for small problems become unreasonably expensive in terms of storage and/or arithmetic operations. This paper discusses the inherent difficulties of developing QP-based methods for large-scale nonlinearly constrained optimization, and suggests some possible approaches. Author (GRA)

N81-23831# Yale Univ., New Haven, Conn. Systems and Information Sciences Dept.
THE STABILITY OF SECOND ORDER QUADRATIC DIFFERENTIAL EQUATIONS, PART 3
Daniel E. Koditschek and Kumpati S. Narendra Dec. 1980 45 p refs
(Contract N00014-76-C-0017)
(AD-A097627; S/IS-8004) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper investigates the stability properties of second order systems, $dx/dt = f(x)$, where $f(x)$ contains either quadratic terms -system (1) or linear and quadratic terms -system (2)-in x. The principal contributions are summarized in two theorems which give necessary and sufficient conditions for stability and asymptotic stability in the large of systems (1) and (2) respectively. Author (GRA)

N81-23832# California Univ., Berkeley. Operations Research Center.
SOME RESULTS ON THE OVERALL RELIABILITY OF UNDIRECTED GRAPHS
A. Satyanarayana, Mark K. Chang, and Zohel S. Khalil (Concordia Univ., Montreal) Feb. 1981 16 p refs
(Contract N00014-75-C-0781; Grant NSF PFR-78-22265; NR Proj. 042-238)
(AD-A097445; ORC-81-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

A probabilistic graph consists of vertices and links that fail with some known probabilities. For such a graph, overall reliability is the probability that there exists communication between all vertex-pairs. In this paper, some useful results are presented to simplify the overall reliability computation of an undirected graph when the failure events of the links are statistically independent. Author (GRA)

N81-23833# Alberta Univ., Edmonton. Dept. of Chemistry.
POLYNOMIAL APPROXIMATION TECHNIQUES FOR DIFFERENTIAL EQUATIONS IN ELECTROCHEMICAL PROBLEMS
B. Stanley Pons 15 Jan. 1981 101 p refs Submitted for publication
(Contract N00014-80-C-0107; NR Proj. 359-718)
(AD-A097631; TR-4) Avail: NTIS HC A06/MF A01 CSCL 07/4

A complete listing of the techniques of weighted residuals and their use in electrochemistry is given. Solutions include those by orthogonal collocation, and direct application to a number of electrochemical techniques, electrode geometrics, and kinetic mechanisms are given. GRA

N81-23834# California Univ., Berkeley. Center for Pure and Applied Mathematics.
THE HAMILTONIAN STRUCTURE OF THE MAXWELL-VLASOV EQUATIONS
Jerrold E. Marsden and Alan Weinstein Feb. 1981 33 p refs
(Contract DAAG29-79-C-0086; Grants NSF MCS-78-06718; NSF MSC-77-23579)
(AD-A097412; PAM-28; TR-12; ARO-16567.8-M) Avail: NTIS HC A03/MF A01 CSCL 12/1

Morrison has shown that the Maxwell-Vlasov and the Vlasov-Poisson equations for a collisionless plasma can be written in Hamiltonian form relative to a certain Poisson bracket. We derive another very similar Poisson structure for these equations using co-adjoint orbits for the group of canonical transformations and the electromagnetic field regarded as a gauge theory. Our construction shows canonical variables can be found and can be extended to Yang-Mills gauge theories. Author (GRA)

N81-23835# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
SECOND DERIVATIVE ALGORITHMS FOR MINIMUM DELAY DISTRIBUTED ROUTING IN NETWORKS
Dimitri P. Bertsekas, Eli M. Gafni, and Robert G. Gallager Mar. 1981 50 p refs
(Contract N00014-75-C-1183; Grant NSF ECS-79-19880; ARPA Order 3045)
(AD-A097623; LIDS-P-1082) Avail: NTIS HC A03/MF A01 CSCL 12/1

We propose a class of algorithms for finding an optimal quasistatic routing in a communication network. The algorithms are based on Gallager's method. Their main feature is that they utilize second derivatives of the objective function and may be viewed as approximations to a constrained version of Newton's method. The use of second derivatives results in improved speed of convergence and automatic stepsize scaling with respect to level of traffic input. These advantages are of crucial importance for the practical implementation of the algorithm using distributed computation. Author (GRA)

N81-23836# Los Alamos Scientific Lab., N. Mex. Computing Div.
VECTORIZATION OF ALGORITHMS FOR SOLVING SYSTEMS OF DIFFERENCE EQUATIONS
B. L. Buzbee 1981 10 p refs Presented at the Simulation Methods for Nucl. Power Systems Conf., Tucson, Ariz., 26-28 Jan. 1981
(Contract W-7405-eng-36)
(LA-UR-81-270; CONF-810113-1) Avail: NTIS HC A02/MF A01

Two types of vector architecture are defined. A discussion is presented on the variation of performance that can occur on a vector processor as a function of algorithm and implementation, the consequences of this variation, and the performance of some basic operators on the two classes of vector architecture. Also discussed is the performance of higher level operators, including some that should be used with caution. With both types of operators, the implementation of techniques for solving systems of difference equations is discussed. Fast Poisson solvers and point, line, and conjugate gradient techniques are included. DOE

N81-23837# California Univ., Livermore. Lawrence Livermore Lab.
RECURSIVE LEAST SQUARES WITH LINEAR CONSTRAINTS
David B. Harris 8 Jan. 1981 6 p refs Presented at the ICASSP 81, Atlanta, 1 Apr. 1981
(Contract W-7405-eng-48)
(UCRL-85330; CONF-810413-1) Avail: NTIS HC A02/MF A01

The use of linear constraints on the coefficients of adaptive transversal filters is proposed for the extraction of polarized waveforms from two channel signals. The method is demonstrated using real seismic data. DOE

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N81-23838*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COMPUTER SIMULATION OF RANDOM VARIABLES AND VECTORS WITH ARBITRARY PROBABILITY DISTRIBUTION LAWS
Victor M. Bogdan (Catholic Univ.) Washington May 1981 43 p refs
(NASA-TP-1859; S-504) Avail: NTIS HC A03/MF A01 CSCL 12A

Assume that there is given an arbitrary n-dimensional probability distribution F. A recursive construction is found for a sequence of functions x sub 1 = f sub 1 (U sub 1, ..., U sub n), ..., x sub n = f sub n (U sub 1, ..., U sub n) such that if U sub 1, ..., U sub n are independent random variables having uniform distribution over the open interval (0,1), then the joint distribution of the variables x sub 1, ..., x sub n coincides with the distribution F. Since uniform independent random variables can be well simulated by means of a computer, this result allows one to simulate arbitrary n-random variables if their joint probability distribution is known. M.G.

N81-23839# Decisions and Designs, Inc., McLean, Va.
AN ASSESSMENT OF MARKOV RENEWAL MODELS IN FORECASTING INTERNATIONAL AFFAIRS
James O. Chinnis, Jr., Anthony N. S. Freeling, and David A. Seaver Feb. 1981 33 p refs Prepared in cooperation with Decision Science Consortium, Inc., Falls Church, Va.
(Contract MDA903-80-C-0194; DARPA Order 3831)
(AD-A097295; TR-81-2) Avail: NTIS HC A03/MF A01 CSCL 12/1

A major difficulty for designers of systems to forecast international affairs has been to allow the use of both observable data and subjective estimates. Under DARPA sponsorship, a novel approach has been developed based upon a Bayesian stochastic model. This approach has been developed and demonstrated in a preliminary fashion by other DARPA contractors. The present report provides a brief appraisal of the approach, offers preliminary suggestions for modifications, and suggests candidate areas of application. The treatment of time and nonstationarity is explored in some detail, and modifications are suggested which could lessen the need to reassess model parameters each time a change occurs in an underlying political process. Author (GRA)

N81-23840# Stanford Univ., Calif. Dept. of Statistics.
A NEW PROOF OF ADMISSIBILITY OF TESTS IN THE MULTIVARIATE ANALYSIS OF VARIANCE
T. W. Anderson and Akimichi Takemura Jan. 1981 35 p refs
(Contract N00014-75-C-0442; NR Proj. 042-034)
(AD-A097110; TR-48) Avail: NTIS HC A03/MF A01 CSCL 12/1

A new proof of admissibility of tests in MNOVA is given using Stein's theorem (1956). The convexity condition of Stein's theorem is proved directly by means of majorization rather than by the supporting hyperplane approach. This makes the geometrical meaning of the admissibility result clearer. Author (GRA)

N81-23841# Stanford Univ., Calif. Dept. of Statistics.
ASYMPTOTIC POWER OF EDF STATISTICS FOR EXPONENTIALITY AGAINST WEIBULL AND GAMMA ALTERNATIVES
Michael A. Stephens 4 Feb. 1981 26 p refs
(Contract N00014-76-C-0475; NR Proj. 042-267)
(AD-A097107; TR-297) Avail: NTIS HC A03/MF A01 CSCL 12/1

Asymptotic distributions of EDF statistics goodness-of-fit statistics based on the empirical distribution function can be obtained by expanding a related function in a series of orthogonal functions. This method was given by Watson and developed especially in this connection by Durbin and Knott and by the author. An earlier approach by Anderson and Darling is different and the newer methods provide a sharper view of the approach to infinity. Similar approaches were employed by Durbin, Knott and Taylor to test for normality and also gave asymptotic power results for certain alternatives and in some cases for tests of exponentiality. In this paper, asymptotic powers of some EDF statistics for testing exponentiality against Weibull and Gamma alternatives are developed. Author (GRA)

N81-23842# Stanford Univ., Calif. Dept. of Statistics.
BROWNIAN APPROXIMATIONS TO FIRST PASSAGE PROBABILITIES
D. Siegmund and Yih-shyh Yuh 15 Dec. 1980 16 p refs
(Contract N00014-77-C-0306; Grant NSF MCS-77-16974; NR Proj. 042-373)
(AD-A097106; SU-TR-13; SU-TR-164) Avail: NTIS HC A02/MF A01 CSCL 12/1

By direct probabilistic argument one term of an Edgeworth type asymptotic expansion is obtained for certain first passage distributions for random walks. These results provide partial justification for and extensions of approximations suggested earlier as a heuristic consequence of Laplace transform calculations. GRA

N81-23843# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
EMPIRICAL BAYES RULES FOR SELECTING GOOD POPULATIONS
Shanti S. Gupta and Ping Hsiao (Wayne State Univ.) Mar. 1981 25 p refs
(Contract N00014-75-C-0455)
(AD-A097619; MIMEOGRAPH-SER-81-5) Avail: NTIS HC A02/MF A01 CSCL 12/1

A problem of selecting populations better than a control is considered. When the populations are uniformly distributed, empirical Bayes rules are derived for a linear loss function for both the known control parameter and the unknown control parameter cases. When the priors are assumed to have bounded supports, empirical Bayes rules for selecting good populations are derived for distributions with truncation parameters (i.e., the form of the pdf is f(x/theta) = P sub i (x)c sub i(theta)I sub (0, theta) (x)). Monte Carlo studies are carried out which determine the minimum sample sizes needed to make the relative errors less than epsilon for given epsilon-values. Author (GRA)

N81-23844# Princeton Univ., N. J. Dept. of Statistics.
PARTIAL CHARACTERIZATIONS OF COMPLETELY NONDETERMINISTIC STOCHASTIC PROCESSES
Peter Bloomfield and Nicholas P. Jewell Nov. 1980 24 p refs
(Contracts N00014-79-C-0322; DE-AC02-81ER-10841)
(AD-A097514; TR-180-SER-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

A discrete weakly stationary Gaussian stochastic process x(t), is completely nondeterministic if no non-trivial set from the sigma-algebra generated by x(t):t = 0 lies in the sigma-algebra generated by x(t):t < or = 0. Levinson and McKean essentially showed that a necessary and sufficient condition for complete non-determinism is that the spectrum of the process is given by absolute value of h squared where h is an outer function in the Hardy space, H (2), of the unit circle in -C with the property that h/h bar uniquely determines the outer function h up to an arbitrary constant. In this paper we consider several characterizations of complete non-determinism in terms of the geometry of the unit ball of the Hardy space H (1) and in terms of Hankel operators, and pose an open problem. Author (GRA)

N81-23845# Princeton Univ., N. J. Dept. of Statistics.
THREE ASPECTS OF THE STATISTICS OF DIRECTIONS
Geoffrey S. Watson Feb. 1981 36 p refs
(Contract N00014-79-C-0322)
(AD-A097489; TR-188-SER-2) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper is a selection of topics from three lectures given to the 21st Summer Research Institute of the Australian Mathematical Society. Lecture 1 gave scientific problems yielding data which are unit vectors, directions, in two and three dimensions. Methods of displaying and summarizing the data were illustrated. Lecture 2 began with the uniform distribution on a sphere of unit radius in q dimensions, then non-uniform distributions were discussed, especially those that arise in certain stochastic processes. Lecture 3 was devoted to a summary of statistical inference methods and concluded with some remarks on problems of greater generality suggested by our subject. Author (GRA)

N81-23846# Princeton Univ., N. J. Dept. of Statistics.
THE FISHER-BINGHAM DISTRIBUTION ON THE SPHERE
John T. Kent (Leeds Univ.) Dec. 1980 28 p refs
(Contract N00014-79-C-0322)
(AD-A097475; TR-181-SER-2) Avail: NTIS HC A03/MF A01 CSCL 12/1

The Fisher distribution is the analogue on the sphere of the isotropic bivariate normal distribution in the plane. The purpose of this paper is to propose and analyze a spherical analogue of the general bivariate normal distribution. Estimation, hypothesis testing and confidence regions are also discussed. Author (GRA)

N81-23847# Princeton Univ., N. J. Dept. of Statistics.
DISTRIBUTIONS ON THE CIRCLE AND SPHERE
Geoffrey S. Watson Nov. 1980 40 p refs
(Contract N00014-79-C-0322)
(AD-A097462; TR-176-SER-2) Avail: NTIS HC A03/MF A01 CSCL 12/1

A survey is made of the mathematical properties of, and the arithmetic relationships between various distributions on the circle and the sphere. Some new results are given. The Brownian motion and Angular Gaussian distributions are shown in computer drawn graphs to bracket the von Mises-Fisher distributions. Author (GRA)

N81-23848# Princeton Univ., N. J. Dept. of Statistics.
ANTIPODALLY SYMMETRIC DISTRIBUTIONS FOR ORIENTATION STATISTICS
Michael J. Prentice (Edinburgh Univ.) Mar. 1981 17 p refs
(Contract N00014-79-C-0322)
(AD-A097460; TR-192-SER-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

The conventional antipodally symmetric Bingham matrix distribution on the Stiefel manifold is generalized. Large sample maximum likelihood estimation and uniformity tests are discussed, and a parametric model for axial orientations (X-shapes) is suggested. A generalization of the Khatri-Mardia matrix distribution is developed to provide a model suitable for hybrids (T-shapes). Beran's results on exponential models for directional data are extended to orientation statistics to provide regression estimators and goodness-of-fit tests as alternatives to maximum likelihood estimation and likelihood ratio tests. Author (GRA)

N81-23849# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.
USE OF SECOND ORDER STOCHASTIC DOMINANCE IN DECISION AIDING
Chelsea C. White, III and Andrew P. Sage Feb. 1981 25 p refs
(Contract N00014-80-C-0542; NR Proj. 197-065)
(AD-A097117; UVA/SE-81-3) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this paper we examine a single-stage, multiobjective decisionmaking problem under uncertainty. The decisionmaker can select any one of a finite number of alternatives. After any alternative is chosen, one of a finite number of outcomes will result. The probabilistic relationship between each alternative and each outcome is presumed to be known. We assume that all that is known about the decisionmaker is that he or she is risk adverse. Our objective is to determine the smallest subset of alternatives that is guaranteed to contain the most preferred alternative on the basis of this assumption. The achievement of this objective presumably enhances decisionmaking since alternative selection is generally easier if made from a subset of the alternative set rather than from the entire alternative set. The intent of this paper is to present an approach which achieves this objective and which has computational times amenable to interactive decision aiding. We make use of a fact, due to Fishburn and Vickson, which states that the feasibility of a certain collection of linear equalities and inequalities represents a necessary and sufficient condition for one alternative to be weakly preferred to another with respect to the second order stochastic dominance (SSD) relation. The approach presented here uses transitivity and upper and lower bounds on this relation in order to reduce the number of concomitant linear programs necessary for solution. The lower bound is provided by the first order stochastic dominance relation; the upper bound is given by a relation that is equivalent to the second order stochastic dominance relation when certain independence conditions hold. An example illustrates these results. Author (GRA)

N81-23850# Decision Science Consortium, Inc., Falls Church, Va.
ALTERNATIVE FRAMEWORKS FOR THE RECONCILIATION OF PROBABILITY ASSESSMENTS
Anthony N. S. Freeling Nov. 1980 76 p refs
(Contract N00014-80-C-0046)
(AD-A097584; TR-80-4) Avail: NTIS HC A05/MF A01 CSCL 12/1

The problem of a probability assessor who has, directly or indirectly, given two different numbers for the probability of one event is addressed. In order to use these assessments in, for example, a decision analysis, these two numbers must be reconciled to give one value as the probability. A detailed

mathematical exposition is given concerning the calculation of the least squares reconciliation in both probability and log odds metrics. It is shown that the method of reconciliation they have proposed is formally equivalent to that of taking a weighted average of log odds, with weights proportional to the independent information content of each assessment. This method has the advantage of being simple in application. It is further argued that the motivation for taking multiple probability assessments is an attempt to obtain more information from the subject, and that the proposed method of reconciliation captures the essence of this motivation. The relationship between this research and the well known 'expert-use' problem is explored. Finally, a discussion of alternative potential approaches to the reconciliation problem is included. GRA

N81-23851# Clemson Univ., S.C. Dept. of Mathematical Sciences.

A GOODNESS-OF-FIT TEST BASED ON SPACINGS

Khursheed Alam and K. M. Lal Saxena (Nebraska Univ. - Lincoln) 3 Jul. 1980 18 p refs

(Contract N00014-75-C-0451)

(AD-A097613; N119; TR-342) Avail: NTIS HC A02/MF A01 CSCL 12/2

The difference between consecutive order statistics from a sample is called a spacing. Various tests based on sample spacings have been considered in the literature for testing the hypothesis that the sample is drawn from a specified distribution. Tests based on the spacings are recommended for use when the alternative distribution differs from the hypothetical distribution in the shape of the density function. In this paper, we consider a test based on the spacings designed for the case when the ratio of the two density functions is a piece-wise monotone function. This paper deals mainly with the large sample properties of the test. Author (GRA)

N81-23852# Clemson Univ., S.C. Dept. of Mathematical Sciences.

AN EMPIRICAL MODEL BUILDING CRITERION BASED ON PREDICTION WITH APPLICATIONS IN PARAMETRIC COST ESTIMATION

A. S. Korkotsides and K. T. Wallenius Aug. 1980 119 p refs

(Contract N00014-75-C-0451; NR Proj. 047-202)

(AD-A097535; N117; TR-349) Avail: NTIS HC A06/MF A01 CSCL 21/1

In the context of multiple linear regression, when a subset of k-out-of-p predictor variables is to be selected for the purpose of predicting the response at some known point in the predictor variables, space, the width of the resulting prediction interval gives an indication of the precision with which the response is predicted and, thus, it may provide a suitable selection criterion. A review of commonly used selection criteria is given, with special emphasis on those which deal with the problem of prediction. The Mahalanobis distance is one of the quantities affecting the width of the prediction interval, and it is studied in some detail. The effects of adding a new variable to a model are investigated and a monotonicity theorem is derived. The influence of an observation on the width of the prediction interval, as measured by the effected change when that observation is set aside, is also investigated and an equivalence between observation deletions and variable augmentation is shown. GRA

N81-23853# Clemson Univ., S.C. Dept. of Mathematical Sciences.

A MONTE CARLO STUDY OF AR(1) ESTIMATORS UNDER SEVERAL PERFORMANCE CRITERIA

H. S. Hill and R. F. Ling Mar. 1981 96 p refs

(Contract N00014-75-C-0451; NR Proj. 047-202)

(AD-A097533; N115; TR-360) Avail: NTIS HC A05/MF A01 CSCL 12/1

The small sample performance of several AR(1) estimators is investigated through the use of Monte Carlo comparison studies. The performance of these estimators is compared with respect to the criteria of bias, mean squared error, mean absolute error, and mean squared prediction error. Statistical performance groupings at various fixed parameter values from (0,1) are determined based on pairwise multiple comparisons of estimator performance results. Two types of two-step adaptive estimators are developed. One type relies on the use of only standard estimators, while the other type includes ad hoc modifications to standard estimators. The efficacy of performance of these estimators is validated through the use of additional Monte Carlo runs based on three different conditions of parameter selection for data generation. The sensitivity of these estimators to their use with larger sample sizes is also investigated. Based on the various simulation results, recommendations regarding estimator selection for use in applied estimation are given. The applicability of the adaptive estimators is discussed and an example illustrating their application in forecasting an economic series is given. Author (GRA)

N81-23854# Clemson Univ., S.C. Dept. of Mathematical Sciences.

THE ACCURACY OF A MODIFIED PEIZER APPROXIMATION TO THE HYPERGEOMETRIC DISTRIBUTION, WITH COMPARISONS TO SOME OTHER APPROXIMATIONS

Robert F. Ling and John W. Pratt (Harvard Univ.) Jul. 1980 35 p refs

(Contract N00014-75-C-0451; NR Proj. 047-202)

(AD-A097541; N126; TR-348) Avail: NTIS HC A03/MF A01 CSCL 12/1

Results of an extensive empirical study of the accuracy of seven normal and three binomial approximations to the hypergeometric distribution are presented in terms of maximum absolute error under various conditions on the variables. The most useful condition is provided by the minimum cell in the given or complementary 2 times 2 table and the tail probability itself. Of the normal approximations, a modification on one due to Peizer is far the best. It has error at most .0001, for example, if the minimum cell is at least 9, or if the tail probability is below .01 and the minimum cell is at least 4. Especially detailed results are given for this approximation. GRA

N81-23855# Clemson Univ., S.C. Dept. of Mathematical Sciences.

PARAMETRIC COST METHODOLOGY

A. S. Korkotsides and K. T. Wallenius Sep. 1980 26 p refs Presented at the IEEE Ann. Reliability and Maintainability Symp., 27-29 Jan. 1981

(Contract N00014-75-C-0451; NR Proj. 047-202)

(AD-A097537; N121; TR-353) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report discusses the concept, advantages and disadvantages of parametric cost estimation and points to the need for explicitly incorporating degree analogy between the system whose cost is to be predicted and the historical data base. Mahalanobis distance is proposed as a measure of analogy and its properties studied. A new variable selection criteria is proposed which incorporates both fit and analogy. An example is given to illustrate its use. Author (GRA)

N81-23856# Clemson Univ., S.C. Dept. of Mathematical Sciences.

ON THE DEGREE OF INFLATION OF MEASURES OF FIT INDUCED BY EMPIRICAL MODEL BUILDING

T. B. Edwards and K. T. Wallenius Aug. 1980 76 p refs

(Contract N00014-75-C-0451; NR Proj. 047-202)

(AD-A097536; N120; TR-350) Avail: NTIS HC A05/MF A01 CSCL 12/1

This dissertation explores the distributional properties of commonly used statistics developed in the course of empirical model building. A review of some of the more noteworthy efforts to investigate the distribution of the coefficient of determination of R-squared in the best subset regression is given. To overcome the shortcomings of these results, a permutation test based on Fisher's randomization test is developed to provide a practical basis for assessing the statistical significance of a regression in such situations. An investigation is made into the distributional properties of the multiple correlation coefficient in the choice of a transformation of the dependent variable. The study investigates the possibility that pedestrian use of transformations, such as $y^* = (y+c)$ to the p, may lead to an inflationary effect on the sample correlation. A practical management science application of the statistical procedures developed in this study is explored in the area of parametric cost estimation. Author (GRA)

N81-23857# Indiana Univ. at Bloomington. Dept. of Mathematics.
RANK-ORDER TESTS FOR THE PARALLELISM OF SEVERAL REGRESSION SURFACES Interim Report
Ching-Yuan Chiang and Nadan L. Puri Feb. 1981 32 p refs Prepared in cooperation with Louisville Univ., Ky.
(Grant AF-AFOSR-2927-76; AF Proj. 2304)
(AD-A097166; AFOSR-81-0205TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

For testing the hypothesis that several (s = or > 2) linear regression surfaces X sub ki = alpha sub k beta sub k c sub ki + Z sub ki (k = 1,...,s) are parallel to one another, i.e., beta sub 1 = ... = beta sub s, a class of rank-order tests are considered. The tests are shown to be asymptotically distribution-free, and their asymptotic efficiency relative to the general likelihood ratio test is derived. Asymptotic optimality in the sense of Wald is also discussed. Author (GRA)

N81-23858# Missouri Univ. -Columbia. Tailored Testing Research Lab.
A COMPARISON OF THE ANCILLES AND LOGIST PARAMETER ESTIMATION PROCEDURES FOR THE THREE-PARAMETER LOGISTIC MODEL USING GOODNESS OF FIT AS A CRITERION
Robert L. McKinley and Mark D. Reckase Dec. 1980 87 p refs
(Contract N00014-77-C-0097; RR0420401)
(AD-A097081; RR-80-2) Avail: NTIS HC A05/MF A01 CSCL 09/2

A study was conducted to compare the quality of the item parameter estimates obtained from the ANCILLES and LOGIST estimation procedures using goodness of fit as a criterion. Statistics used to compare the fit yielded by the procedures included a chi-square statistic and a mean square deviation statistic. Other analyses performed included comparisons of the distributions of the parameter estimates obtained from the procedures, and a set of meta-analyses performed on the chi-square statistics obtained for the items. The data for the study was composed of 50 items and 2,000 cases obtained using a stratified random sample of 357 items and 4,000 cases of the Iowa Tests of Educational Development. Results indicated that differences did exist in the quality of parameter estimates obtained from the ANCILLES and LOGIST procedures. More items for ANCILLES showed significant lack of fit than for LOGIST, based on the chi-square tests. However, a test to determine whether the ANCILLES chi-squares were longer than the LOGIST chi-squares significantly more than half the time was not significant. Also, the dependent t-computed for the MSD statistics was not significant. Further analyses indicated that the parameter estimates obtained from the two procedures were highly correlated. Comparisons of the item parameter estimates with the chi-square values indicated that ANCILLES yielded poor fit for items with extreme difficulty values. Because of this, and the fact that ANCILLES did not provide estimates for all the items, it was conducted that there were real differences in the quality of the parameter estimates obtained for the two procedures.
Author (GRA)

N81-24001*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
POSTER ERROR PROBABILITY IN THE MU-11 SEQUENTIAL RANGING SYSTEM
C. W. Coyle *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 15-21 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 12A

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N81-23859# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
CONTINUOUS MODEL OF AN UNRELIABLE TWO-STAGE MATERIAL FLOW SYSTEM WITH A FINITE INTERSTAGE BUFFER
Stanley B. Gershwin and Irvin C. Schick Sep. 1980 64 p refs
(Grant NSF DAR-79-17826)
(PB81-146862; LIDS-R-1039; NSF/RA-800333) Avail: NTIS HC A04/MF A01 CSCL 09B

A two stage material flow production system model is presented and analyzed. The material to be processed is continuous; the processing stages are unreliable; and a finite buffer stores material between the stages. The model is intended to facilitate study of the finite buffer and random behavior of the stages. It is justified as a representation of a production process in several ways. The relationship between this model and a model of discrete material flow is established. Performance measures, including production rate, average inprocess inventory, and probabilities of starvation and blockage are calculated. Relationships among these measures are demonstrated and numerical experiments discussed. GRA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N81-23860 Drexel Univ., Philadelphia, Pa.
FORMULATION OF NONLINEAR NETWORK EQUATIONS USING TOPOLOGICAL POTENTIAL FUNCTIONS Ph.D. Thesis
Francis Michael Massimo 1980 159 p
Avail: Univ. Microfilms Order No. 8107674

The derivation of the network equations for a general class of nonlinear network from two topological methods is discussed. The first method develops the Brayton-Moser equations from a topological mixed potential function P sub T. The second method establishes Lagrangian theory from a topological point of view with the unique distinction in the choice of generalized variables. The establishment of Brayton-Moser's equations from the topological mixed potential function was accomplished after the proof of the existence of P sub T was provided. To obtain Brayton-Moser's equations, a relationship between P sub T and Brayton-Moser's mixed potential function was established. Due to the concept of the generalized Euler-Lagrange equations, a Lagrangian formulation for RLCS networks of a broader scope is presented. Subtrees and subchords are utilized to determine the generalized coordinates and velocities in defining the Lagrangian. A feature of this choice of variables is that the number of generalized coordinates need not be equal to the number of generalized velocities. Dissert. Abstr.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

No abstracts in this category.

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N81-23861*# Stanford Univ., Calif.
A NOTE ON SOUND RADIATION INTO A UNIFORMLY FLOWING FLUID Interim Report
Harold Levine Jan. 1980 17 p ref
(Contract NCC2-55)
(NASA-CR-166177; SU-JIAA-TR-31) Avail: NTIS HC A02/MF A01 CSCL 20A

Sound radiation generated by mechanical or vibratory

source arrangements and, in some instances of planar or piston types, encompasses all magnitudes of the wavelength or frequency as well as disposition of the observation site. The comparative increase in average total radiated power from infinitesimally small or point sources of periodic strength, on passing from rest to steady rectilinear motion, depends only on Mach number in the noncompact case; and a formally analogous rise in output is linked, to the presence of a steady parallel flow past a rigid plane wall in which a compact circular piston executes normal oscillations. The perspective of effects connected with such a background is flow is widened by regard for an elongated or strip piston, which prototype permits a straightforward and general analysis. S.F.

N81-23862*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

LATERAL ATTENUATION OF HIGH-BY-PASS RATIO ENGINED AIRCRAFT NOISE

William L. Willshire, Jr. Apr. 1981 38 p refs

(NASA-TM-81968) Avail: NTIS HC A03/MF A01 CSCL 20A

A flight experiment was conducted to investigate the lateral attenuation of high by pass ratio engined airplanes. A B-747 was flown at low altitudes over the ends of two microphone arrays. One array covering a lateral distance of 1600 m consisted of 14 microphones positioned over grass. The second array covered a lateral distance of 1200 m and consisted of 6 microphones positioned over a concrete runway. Sixteen runs were flown at altitudes ranging from 30 to 960 m. The acoustic information recorded in the field was reduced to one third octave band spectral time histories and synchronized with tracking and weather information. Lateral attenuation as a function of elevation angle was calculated in overall, A-weighted, tone-corrected perceived noise level, and effective perceived noise level units. The B-747 results are compared with similar results for a turbojet-powered T-38 airplane and the SAE recommended lateral attenuation prediction procedure. Less lateral attenuation was measured for the B-747 than for the T-38. The B-747 lateral attenuation values also fell below the SAE curve. Author

N81-23863*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.

A STUDY OF POULTRY PROCESSING PLANT NOISE CONTROL TECHNIQUES Final Report

J. C. Wyvill and W. G. Morrison, Jr. May 1981 98 p refs (Grant NsG-3228)

(NASA-CR-164291) Avail: NTIS HC A05/MF A01 CSCL 20A

A number of techniques can be used to reduce noise in poultry processing plants. In general, covering the ceiling with a noise-absorbing medium is a practical first step. Once the reflected noise levels are abated, treatment of specific identifiable noise courses can take place. The development, flammability, and mechanical properties of acoustic panels to be vertically suspended from the ceiling are discussed as well as the covers need to comply with USDA cleanability requirements. The isolation of drive motors and pumps from large expansive areas, the muffling of pneumatic devices, and the insulation of ice chutes are methods of source quieting. Proper maintenance of machinery and vibration monitoring are also needed to reduce hearing damage risk and to improve worker productivity and employee/supervisor relations. A.R.H.

N81-23864# Boeing Vertol Co., Philadelphia, Pa.

A STUDY OF THE EFFECT OF TERRAIN ON HELICOPTER NOISE PROPAGATION BY ACOUSTICAL MODELING Final Report

Harry Sternfeld, Jr. 23 Mar. 1981 57 p refs

(Contract DAAG29-78-C-0002)

(AD-A097626; ARO-14795.1-E) Avail: NTIS HC A04/MF A01 CSCL 17/1

An experimental program was conducted to evaluate the applicability of acoustical modeling techniques to study the effects of terrain on helicopter noise propagation. Comparison of model results with flyover data of a full scale UH-1 helicopter showed very good correlation with 500 ft altitude data and moderately good correlation with 50 ft altitude data. Model studies of the effects of the blocking and channeling of sound by barriers, such as hills, shows good correlation with expected results for simple cases with the model providing useful results for more complex cases. Author (GRA)

N81-23865# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

EFFECTS OF SURFACE-MAPPING CORRECTIONS AND SYNTHETIC-APERTURE FOCUSING TECHNIQUES ON ULTRASONIC IMAGING

B. A. Barna and J. A. Johnson Jan. 1981 79 p refs

(Contract DE-AC07-76ID-01570)

(EGG-FM-5314) Avail: NTIS HC A05/MF A01

Improvements in ultrasonic imaging that can be obtained using algorithms that map the surface of targets are evaluated. This information is incorporated in the application of synthetic-aperture focusing techniques which also have the potential to improve image resolution. Images obtained using directed-beam (flat) transducers and the focused transducers are quantitatively compared by using no processing, synthetic-aperture processing with no corrections for surface variations, and synthetic-aperture processing with surface mapping. The synthetic-aperture-processed images show at least a twofold improvement in lateral resolution and greatly reduced interference effects in multiple-hole images compared to directed-beam images. To correct for displacement, an algorithm was developed for calculating the surface variations. The corrected images produced using this algorithm are accurate within the experimental error. In addition, the same algorithm, when applied to the directed-beam data, produced images that are not only accurately positioned, but that also have a resolution comparable to conventional synthetic-aperture-processed images obtained from focused-transducer data. DOE

N81-23866# General Atomic Co., San Diego, Calif.

RESPONSE OF A THERMAL BARRIER SYSTEM TO ACOUSTIC EXCITATION IN A GAS TURBINE NUCLEAR REACTOR

W. S. Betts, Jr. and R. D. Blevins Nov. 1980 10 p refs Presented at the ASME Gas Turbine Conf., Houston, Texas, 8 - 12 Mar. 1981

(Contract DE-AT03-76SF-70046)

(GA-A-16016; CONF-810309-7) Avail: NTIS HC A02/MF A01

A gas turbine located within a high temperature gas cooled reactor (HTGR) induces high acoustic sound pressure levels into the primary coolant (helium). This acoustic loading induces high cycle fatigue stresses which may control the design of the thermal barrier system. The dynamic response of a thermal barrier configuration consisting of a fibrous insulation compressed against the reactor vessel by a coverplate, held in position by a central attachment fixture is examined. The results of dynamic vibration analyses indicate the effect of the plate size and curvature and the attachment size on the response of the thermal barrier. DOE

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N81-23867*# SRI International Corp., Menlo Park, Calif. Molecular Physics Lab.

QUANTITATIVE ABSORPTION AND FLUORESCENCE STUDIES OF NO BETWEEN 1060 AND 2000 A

J. A. Guest and L. C. Lee 11 Feb. 1981 29 p refs

(Contract NASw-3270)

(NASA-CR-164340; MP-80-153) Avail: NTIS HC A03/MF A01 CSCL 20H

Synchrotron radiation in the 1060 to 2000 A region was used to measure the average absorption and fluorescence cross sections of NO and to determine approximate photodissociation quantum yields. Several vibrational levels of the D(2) sigma(+), E(2) sigma(+), and B(2) delta states have high fluorescence quantum yields. The C(2) and B(2) states do not fluoresce when the excitation energies are above the first dissociation limit, in accord with previous experiments. In general, the fluorescence

yields decrease with increasing photon energy. The quantitative measurements are compared with spectroscopic observations and are found to be reasonably consistent. M.G.

N81-23868*# Stanford Univ., Calif.
SYNCHROTRON EMISSIVITY FROM MILDLY RELATIVISTIC PARTICLES
Vahe Petrosian Apr. 1981 35 p refs
(Grant NsG-7092)
(NASA-CR-164335; SU-SUIPR-832) Avail: NTIS HC A03/MF A01 CSCL 20H

Approximate analytic expressions are presented for evaluation of the frequency and angular dependence of synchrotron emissivity from mildly relativistic particles with arbitrary energy spectrum and pitch angle distribution in a given magnetic field. Results agree with previous expressions for a nonrelativistic Maxwellian particle distribution, and when extrapolated to nonrelativistic and extreme relativistic regimes, they also agree with the previous expressions obtained under those limiting conditions. The results from the analytic expression are compared with results from detailed numerical evaluations. Excellent agreement is found not only at frequencies large compared to the gyro-frequency but also at lower frequencies, in fact, all the way down to the gyro-frequency, where the analytic approximations are expected to be less accurate. J.M.S.

N81-23869# Clarkson Coll. of Technology, Potsdam, N.Y.
FLUORESCENT SCATTERING BY MOLECULES EMBEDDED IN SMALL PARTICLES Comprehensive Report, 1977 - 1980
P. J. McNulty and Herman W. Chew 1980 11 p refs
(Contract DE-AS02-77EV-04361)
(DOE/EV-04361/T2) Avail: NTIS HC A02/MF A01

A proposed formalism for calculating the inelastic (Raman and Fluorescent) scattering by active molecules which are embedded in a dielectric particle with microscopic dimensions is described. This problem had direct application to optical being developed to monitor pollution. The proposal included theoretical arguments to show that the angular distribution, intensity, and polarization of the Raman or fluorescent scattering signal will depend not only upon the number of active molecules but also upon the particle size, shape, refractive index, internal structure, and the distribution of the active molecules within the particle. R.C.T.

N81-23870# Marquette Univ., Milwaukee, Wis. Dept. of Chemistry.
VIRTUAL PHOTOPRODUCTION OF HIDDEN AND OPEN CHARM
A. R. Clark, K. J. Johnson, L. T. Kerth, S. C. Loken, T. W. Markiewic, P. D. Meyers, W. H. Smith, M. Strovink, W. A. Wenzel, R. P. Johnson (Fermi National Accelerator Lab., Batavia, Ill.) et al Nov. 1980 38 p refs Presented at the SLAC/Summer Inst. Conf. on the Weak Interaction, Menlo Park, Calif., 28 Jul. - 8 Aug. 1980 Prepared in cooperation with Princeton Univ.
(Contract W-7405-eng-48)
(LBL-11844; CONF-800782-1) Avail: NTIS HC A03/MF A01

The Berkeley-Fermilab-Princeton multimuon spectrometer and the techniques used to analyze the data which it has collected are described. Limits on the cross section with which possible heavy neutral or doubly charged muons are produced via right handed charged currents are presented. The phenomenology of muoproduction is discussed with an emphasis on the predictions of the vector dominance and photon-gluon-fusion models. The first heavy-quark data discussed are the dimuon-mass spectrum observed in trimuon final states, which provides a limit on muoproduction of the Y family. The bulk of the quarkonium results are devoted to J/psi(3100) muoproduction. A combined analysis of the polarization and Q(2) dependence of elastically produced psi's is presented. The muoproduction of open charm, observed in events with two muons in the final state is also examined. DOE

N81-23871# Ames Lab., Iowa.
NEW TECHNIQUES IN ATOMIC AND MOLECULAR LASER SPECTROSCOPY Ph.D. Thesis
Larry Eugene Steenhoek Feb. 1981 170 p refs
(Contract W-7405-eng-82)
(IS-T-936) Avail: NTIS HC A08/MF A01

The development of laser spectroscopic techniques is described. Nonlinear spectroscopic techniques described are two and three photon absorption and inverse Raman spectroscopy. The Doppler free two photon spectroscopy of naphthalene, the determination of absolute Raman cross sections, and resonance enhanced three photon absorption of molecular iodine are reported. Spatial mapping of spectral sources, coupling the use of a laser with digital image processing technology, is described. The mapping of atomic and molecular species in flames and mapping atomic species in laser generated vapor plumes is presented. Circuit diagrams are illustrated and described, and computer programs are given. J.D.H.

N81-23872# Los Alamos Scientific Lab., N. Mex.
ELASTIC SCATTERING OF POLARIZED DEUTERONS FROM HYDROGEN AT 2.0, 1.6, AND 1.2 GeV AND SEARCH FOR CRITICAL OPALESCENCE IN ELASTIC SCATTERING OF PROTONS FROM CARBON-12 AT 800 MeV Ph.D. Thesis
Seyed-Mohammad Haji-Saeid Jan. 1981 232 p refs
(Contract W-7405-eng-36)
(LA-8662-T) Avail: NTIS HC A11/MF A01

Large deuteron vector and tensor asymmetries were measured at intermediate energies. The polarized deuteron beam (with tensor and vector components of 0.75 and 0.25, respectively) was used at energies of 2.0, 1.6, and 1.2 GeV. The tensor and vector quantities P sub YY and P sub Y were extracted from the data obtained within beam polarization normal to the scattering plane, and P sub xx was obtained when the polarization was processed into the scattering plane. Analysis of the data using multiple scattering theory demonstrates the importance of the noneikona correction to the Glauber Model and also the sensitivity of the data to double spin flip components of the NN amplitudes. The differential cross section for the (12)C(p,p')(12)C* (15.11 MeV, 1(+), T=1) reaction was measured at 800 MeV; the range of the angular distribution corresponds to momentum transfers of 0.7 to 2.4 fm(-1) (1 to 3.3 m sub p). The cross section decreases almost exponentially at large angles; no maximum is observed in the region where nuclear critical opalescence might be expected. Cross sections measured in parallel to the 15.11 MeV state were for the levels at 11.83 (2-), 12.71 (1), 13.35 (2-), 16.1 (2+), and 16.58 (2-) MeV. DOE

N81-23873# Ames Lab., Iowa. Dept. of Physics.
RAMAN SCATTERING BY A MOLECULE ADSORBED AT THE SURFACE OF A THIN METALLIC FILM Ph.D. Thesis
Mark Francis Wright 1980 85 p refs
(Contract W-7405-eng-82)
(IS-T-922) Avail: NTIS HC A05/MF A01

The Raman scattering cross section is calculated using standard third order perturbation theory. The scattering is viewed as a three-stage process: an electron-hole pair is created in the metal by the incident photon; the excited electron scatters off the molecule inelastically, exciting a molecular vibration; the electron finally recombines with the hole emitting the Raman scattering photon. The electrons in the film are confined by infinite potential barriers at the surfaces, but are otherwise free. The resulting sinusoidal one-electron eigenfunctions are used to calculate the nonlocal conductivity tensor in the random phase approximation. Maxwell's equations are then used to determine the vector potential inside the film, which allows the electron-photon matrix elements to be calculated. The electron-molecule interaction is deduced from experimental data on low energy inelastic electron scattering from polar molecules. DOE

N81-23874# Texas A&M Univ., College Station. Dept. of Physics.
THREE-BODY HELICITY FORMALISM APPLIED TO PION-DEUTERON SCATTERING
Humberto Garcilazo 1980 27 p refs
(Contract DE-AS05-76ER-05223)
(DOE/ER-05223/31) Avail: NTIS HC A03/MF A01

Wick's three body helicity formalism is applied to covariantly reduce the relativistic Faddeev equations that describe pion-deuteron elastic scattering, obtaining a set of equations that satisfy two and three body unitarity and are Lorentz invariant with regard to both the space and the spin variables. All the

pion-nucleon S and P wave channels and the two nucleon-nucleon S wave channels are used as input to give a good description of the data for pion kinetic energies in the region from 142 MeV upt o 512 MeV. DOE

N81-23875# Tennessee Univ., Knoxville. Dept. of Physics and Astronomy.
INTERACTION OF SLOW ELECTRONS WITH HIGH-PRESSURE GASES (QUASI-LIQUIDS): SYNTHESIS OF OUR KNOWLEDGE ON SLOW ELECTRON-MOLECULE INTERACTIONS Progress Report
L. G. Christophorou and D. L. McCorkle 1981 16 p refs
(Contract DE-AS05-76EV-04703)
(DOE/EV-04703/T1) Avail: NTIS HC A02/MF A01

Research on electron interaction with molecules at high pressure is reported. This includes electron collisions with chlorofluorethanes; temperature dependence of electron attachment to halocarbons; electron energy distribution functions in argon; the role of electron attachment in the breakdown strength of gaseous dielectrics; a new high temperature swarm experiment; electron scattering from molecules of environmental interest; negative ions of polyatomic molecules; electron motion in high pressure polar gases (NH3); fast gases for radiation detectors; and electron affinities of atoms and molecules. DOE

N81-23876# Purdue Univ., Lafayette, Ind. School of Nuclear Engineering.
INTEGRAL TESTS OF FAST NEUTRON DOSIMETRY CROSS SECTIONS Final Report
R. H. Johnson Jan. 1981 80 p refs
(Contract DE-AS02-76ET-37237; EPRI Proj. 514-1)
(EPRI-NP-1658) Avail: NTIS HC A05/MF A01

Integral tests of a variety of dosimetry cross sections were performed using the fast breeder blanket facility (FBBF). A number of dosimetry reaction rates (both fission and activation) were measured at selected positions within the FBBF. The reactions studied were chosen from the set of dosimetry reactions being used in EPRI's pressure vessel surveillance program. Neutron spectra were measured at the same positions using proton recoil spectrometry; calculated spectra were also available for those positions. Composite neutron spectra, based on measurements as well as calculations, were used with the ENDF/V-IV dosimetry file to calculate the dosimetry reactions rates. These calculated reaction rates were compared with measured reaction rates. DOE

N81-23877# Georgia Univ., Athens. Dept. of Physics.
HIGH-ENERGY HADRON-HADRON COLLISIONS
T. T. Chou Feb. 1981 12 p refs
(Contract DE-AS09-76ER-00946)
(DOE/ER-00946/T1) Avail: NTIS HC A02/MF A01

Work on high energy hadron-hadron collisions in the geometrical model is summarized. Specific items that were studied include the existence and movement of dips in elastic p anti-p collisions, the angular distributions for elastic scattering and diffraction dissociation of hadrons on nuclei, and a model calculation of scattering parameters in high energy two body collisions. DOE

N81-23878# Argonne National Lab., Ill.
PLAN FOR THE FUTURE OF NEUTRON RESEARCH ON CONDENSED MATTER: AN ARGONNE NATIONAL REPORT PREPARED IN RESPONSE TO THE REPORT OF THE REVIEW PANEL ON NEUTRON SCATTERING
27 Jan. 1981 31 p
(Contract W-31-109-eng-38)
(ANL-81-5) Avail: NTIS HC A03/MF A01

An alternative plan for the future of neutron research on condensed matter is presented. This plan leads, in a rational and logical way, to a world class neutron source that will ensure the vitality of the field and exploit the many benefits that state of the art neutron facilities can bring to programs in the materials and biological sciences. DOE

N81-23879# California Univ., Berkeley.
EXTENDED RATE EQUATIONS
Bruce W. Shore (Centre European de Calcul Atomique et Moleculaire, Orsay, France) 30 Jan. 1981 40 p
(UCID-18932) Avail: NTIS HC A03/MF A01

The equations of motion are discussed which describe time dependent population flows in an N-level system, reviewing the relationship between incoherent (rate) equations, coherent (Schrodinger) equations, and more general partially coherent (Bloch) equations. Approximations are discussed which replace the elaborate Bloch equations by simpler rate equations whose coefficients incorporate long-time consequences of coherence. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N81-23880# Foundation Sciences, Inc., Portland, Oreg.
OREGON-BASED ACTIVITIES IN SUPPORT OF THE BASALT WASTE ISOLATION PROJECT
Lawrence E. Wilkinson Jan. 1980 22 p Presented at the Oregon Sect. Am. Nucl. Soc., Salem, Oreg., 16 Jan. 1980 Prepared for Rockwell International, Richland, Wash.
(Contract DE-AC06-77RL-01030)
(RHO-BWI-SA-42; CONF-800153-1) Avail: NTIS HC A02/MF A01

The feasibility of utilizing basalt for nuclear waste storage is considered with emphasis on the design, construction, and testing of basalts in a near surface test facility (NSTF) within the Hanford Site. The NSTF is composed of rooms embedded in the central portion of a basalt flow. In situ tests planned include experiments with electric heaters, followed by experiments with spent fuel where the combined effect of heat and radiation will be examined. Approximately 3000 feet of tunnels and test room area are being constructed in Gable Mountain on the Hanford site. DOE

N81-23881# Department of Energy, Las Vegas, Nev. Operations Office.
NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS Quarterly Report, Jul. - Sep. 1980
Dec. 1980 45 p refs
(NVO-196-20) Avail: NTIS HC A04/MF A01

Tasks performed to improve the technology of nuclear waste storage and disposal and to determine whether underground rock media at NTS are acceptable for a high level nuclear waste repository are described. These include: weapons test seismic investigations, geologic and hydrologic investigations, media investigations, engineering and technical support, quality assurance, technical overview, Climax spent fuel test, National Waste Terminal Storage program support, rock mechanics investigations, and radionuclide migration investigations. DOE

N81-23882# Battelle Pacific Northwest Labs., Richland, Wash.
REVIEW OF HIGH-LEVEL WASTE FORM PROPERTIES
J. M. Rusin Dec. 1980 133 p refs
(Contract DE-AC06-76RL-01830)
(PNL-3035) Avail: NTIS HC A07/MF A01

Waste form options for the immobilization of high-level-liquid wastes from the nuclear fuel cycle are reviewed. Proposed waste forms have properties falling within a relatively narrow range. In regard to crystalline versus glass waste forms, either glass of crystalline materials have some advantage when a single property is considered; however, at this date no single waste form offers optimum properties over the entire range of characteristics investigated. A long-term effort is applied to the development of glass and calcine waste forms. Synthetic minerals, the multibarrier approach with coated particles in a metal matrix, and high pressure-high temperature ceramics offer advantages. DOE

N81-23883# Los Alamos Scientific Lab., N. Mex.
DISSIPATION AND DIFFUSION IN NUCLEAR FISSION
J. Rayford Nix (Ludwig-Maximilians Univ., Munich) and Arnold J. Sierk 1981 8 p refs Presented at the 19th Intern. Winter Meeting on Nucl. Phys., Bormio, Italy, Jan. 1981

(Contract W-7405-eng-36)
(LA-UR-81-301; CONF-810119-1) Avail: NTIS HC A02/MF A01

The dynamical descent of nuclei from the fission saddle point onwards was calculated for two extreme dissipation mechanisms: wall and window one body dissipation and ordinary two body viscosity. This calculation was done by solving numerically the classical generalized Hamilton equations of motion for a fissioning nucleus, with the nuclear potential energy of deformation calculated in terms of a Coulomb energy and a double volume integral of a Yukawa-plus-exponential folding function, the collective kinetic energy calculated by means of the Werner-Wheeler approximation to incompressible irrotational flow. DOE

N81-23884# Oak Ridge National Lab., Tenn. Engineering Physics Div.
METHOD FOR SAMPLING FROM FISSION NEUTRON ENERGY SPECTRA
F. H. Froehner (Kernforschungszentrum, Karlsruhe, West Germany) and R. R. Spencer Feb. 1981 13 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7631) Avail: NTIS HC A02/MF A01

A simple method for fast and efficient sampling from the Watt fission neutron energy spectrum is described. As a limiting case the Maxwellian energy distribution can also be sampled. A short FORTRAN routine written for this purpose and results obtained with it are presented. The routine is shown to give accurate results, and requires < 1 ms/sample on a DEC KA-10 processor. DOE

N81-23885# California Univ., Livermore. Lawrence Livermore Lab.
SAUSAGE MODE OF A PINCHED CHARGED PARTICLE BEAM
E. P. Lee 10 Feb. 1981 34 p refs
(Contracts W-7405-eng-48; N60921-80-WR-W0188; DARPA Order 3718)
(UCID-18940) Avail: NTIS HC A03/MF A01

The axisymmetric oscillations of a self-pinched charged particle beam are analyzed using a dispersion relation derived from a 3/2 dimensional model. This calculation includes the effects of rounded profiles, finite conductivity, a steady return current, and phase mix damping among particle orbits. However, only the lowest order radial mode of distortion is treated, and this is done in an approximate fashion. DOE

74 OPTICS

Includes light phenomena.

N81-23886 California Univ., San Diego.
STUDIES IN DIGITAL OPTICAL PROCESSING Ph.D. Thesis
Ravindra Anant Athale 1980 168 p
Avail: Univ. Microfilms Order No. 8107454

Optical parallel logic (OPAL) devices that perform basic logic operations on binary optical images were developed. A OPAL device consists of a two dimensional array of cells, with each cell divided into two parts: one containing a photoconductor and the other containing an electrooptic light modulator. An OPAL device which used CdS and twisted nematic liquid crystal was fabricated and its operations demonstrated. Three examples of digital optical circuits which used OPAL devices were studied. Also the input-output response of the OPAL device was studied. A structure for a digital optical processor was proposed. It consists of a programmable optical logic unit, several binary optical memory devices and a microprocessor based controller. Dissert. Abstr.

N81-23887 Carnegie-Mellon Univ., Pittsburgh, Pa.
NOVEL PASSIVE AND ACTIVE OPTICAL DEVICES IN WAVEGUIDE STRUCTURES Ph.D. Thesis
Fathi Rajab El-Akkari 1980 140 p
Avail: Univ. Microfilms Order No. 8100609

Two types of guided-wave devices which utilize electrooptic effect in a Y-cut LiNbO3 substrate for optical switching and modulation applications are described. Metal electrodes are deposited on the surface of thin-film channel waveguides to induce the switching. The switching and/or modulation is implemented by either electrically controlled total internal reflection or modulating the coupling efficiency between two coupled tapered channel waveguides. Titanium-diffused channel waveguides are used in all devices studied. All devices are evaluated by coupling TE polarized He-Ne laser light via a pair of rutile prisms. Dissert. Abstr.

N81-23888# Cornell Univ., Ithaca, N. Y.
ATTENUATION AND COUPLING OF FAR INFRARED SURFACE PLASMONS
Z. Schlesinger, B. C. Webb, and A. J. Sievers [1981] 13 p
Avail: NTIS HC A02/MF A01

Measurements of far infrared surface electromagnetic wave (SEW) transmission on Ge coated Au and Pb surfaces are described. The SEW attenuation coefficients measured on surfaces with Ge overlayers thicker than about 0.5 microns are found to be in rough agreement with Drude theory. For d less than 0.5 microns the attenuation coefficients are anomalous both in their magnitude and d dependence. It is concluded that bulk electromagnetic waves transmitted along the metal surface account for most of the observed signal in this region. This interpretation is substantiated by a calculation of SEW and bulk wave coupling efficiencies as a function of overlayer thickness, d. Spreading of the bulk wave packet in the direction perpendicular to the surface as it propagates along the surface accounts for the large attenuation coefficients previously attributed to SEW's on bare metal surfaces. M.G.

N81-23889*# Old Dominion Univ., Norfolk, Va. Dept. of Electrical Engineering.
FEASIBILITY STUDY OF A MICROPROCESSOR BASED OCULOMETER SYSTEM Final Report, 1 Jan. 1977 - 31 Dec. 1980
Murali R. Varanasi (Univ. of South Florida, Tampa) Jan. 1981 93 p refs
(Grant NsG-1379)
(NASA-CR-164286) Avail: NTIS HC A05/MF A01 CSCL 20F

The elimination of redundancy in data to maximize processing speed and minimize storage requirements were objectives in a feasibility study of a microprocessor based oculometer system that would be portable in size and flexible in use. The appropriate architectural design of the signal processor, improved optics, and the reduction of size, weight, and power to the system were investigated. A flow chart is presented showing the strategy of the design. The simulation for developing microroutines for the high speed algorithmic processor subsystem is discussed as well as the Karhunen-Loeve transform technique for data compression. A.R.H.

N81-23890# Honeywell Systems and Research Center, Minneapolis, Minn.
ADVANCED TARGET TRACKER CONCEPTS Quarterly Progress Report, 1 Apr. - 30 Jun. 1980
P. M. Narendra and B. L. Westover Jul. 1980 36 p
(Contract DAAK70-79-C-0150)
(AD-A097358; HONEYWELL-81SRC19; QPR-3) Avail: NTIS HC A03/MF A01 CSCL 17/8

Conventional target tracking approaches rely on numerical correlation over successive frames on a window around the target. They are therefore sensitive to partial obscuration and changes in target and background appearances. Furthermore, multiple-target tracking requires replication of the hardware. In this third quarterly report, we present the results of the continuing development of a multiple-target tracking approach based on a dynamic scene model derived from the analysis of time sequence of imagery. Simulation results demonstrate multiple-target tracking in cluttered backgrounds and in imagery from fast-moving platforms. The approach can be implemented as an integral part of the Honeywell target screener system. Author (GRA)

N81-23891# ITT Electro-Optical Products Div., Roanoke, Va.
HIGH PRECISION FIBER DEVELOPMENT Final Technical Report, 24 Sep. 1979 - 15 Feb. 1981
Frank I. Akers and Harold D. Shepherd 15 Jan. 1981 77 p

(Contract N00173-79-C-0341)
(AD-A097444; ITT-81-02-01; NRL-79-0341-1) Avail: NTIS HC A05/MF A01 CSCL 20/6

The improvement of single-mode precision fiber is critical to the efficient use of these fibers in connectors and to allow for low loss splices. Similarly, the alignment of fibers to integrated optic devices demands high precision. Likewise, the precision of large core multimode fibers affects coupler and connector losses as well as overall optical and physical performance. In accordance with the statement of work (SOW), EOPD has evaluated the parameters that affect the fabrication of high precision 100 micrometer core fiber and single-mode precision fiber. ITT EOPD has completed the full dimensional evaluation of precision shrunk, ground, and polished natural fused quartz tubing. Additionally, ITT has verified the od uniformity of precision shrunk, ground, and polished Vycor brand silica glass tubing. Fibers made from preforms utilizing the above substrates met all requirements of this contract. The large core deliverable had a fiber od of 140 micrometers with a fiber core diameter of 100.1 micrometers, well within the limits of the contract. Other measurements showed the core eccentricity to be less than 0.08%; optical loss at 0.85 micrometers was 7.94 dB/km while the NA was 0.29. Measurements of the low NA deliverable revealed an average NA of 0.11, an od of 80.5 micrometers, and a core eccentricity of 0.20%. For the high NA fiber, the NA value ran 0.20; the od was the same as the low NA, 80.5 micrometers, while the core eccentricity ran less than 0.20%. GRA

N81-23892# Harry Diamond Labs., Adelphi, Md.
THE ACOUSTO-OPTIC INTERACTION IN AN INFINITE SLAB OF ISOTROPIC MATERIAL
William D. Scharf Apr. 1980 18 p refs
(DA Proj. 1L1-61101-A91-A)
(AD-A097202; HDL-TR-1921) Avail: NTIS HC A02/MF A01 CSCL 17/1

A perturbation theory approach is taken to the problem of the diffraction of an optical plane wave by an acoustic wave propagating in an infinite slab of isotropic material. This treatment does not, like earlier treatments, neglect reflections at the interfaces, and thus can be applied to transparent solids, for which there is an abrupt wave-impedance mismatch at the interfaces. Author (GRA)

N81-23893# Sonicraft, Inc., Chicago, Ill.
ATMOSPHERIC TRANSMITTANCE/RADIANCE COMPUTER CODE FASCOD2
W. L. Ridgway, R. A. Moose, and A. C. Cogley 8 Aug. 1980 45 p refs
(Contract F19628-79-C-0120; AF Proj. 7670)
(AD-A097593; SR-1; AFGL-TR-80-0250) Avail: NTIS HC A03/MF A01 CSCL 04/1

The fast line-by-line transmittance and radiance code FASCOD1 has been changed to include the AFGL geometry routine ATMPTH and the aerosol models of the lower resolution code LOWTRAN 5. The code utilizes an optical path subject to continuous refraction and accounts for losses due to molecular and aerosol absorption and scattering. The problem of non-LTE radiance and transmission has been studied and code changes proposed. Absorption from the sub-Lorentzian CO2 far line wings is also discussed. Author (GRA)

N81-23894# Environmental Research Inst. of Michigan, Ann Arbor. Radar and Optics Div.
HIGH RESOLUTION IMAGING OF SPACE OBJECTS Interim Report, 1 Oct. 1979 - 30 Sep. 1980
James R. Fienup Mar. 1981 135 p refs
(Contract F49620-80-C-0006; AF Proj. 2311)
(AD-A097359; ERIM-145400-7-P; AFOSR-81-0335TR) Avail: NTIS HC A07/MF A01 CSCL 03/1

This report describes the results of a research effort to investigate a method of obtaining high resolution images of space objects using Earth-bound optical telescopes despite the turbulence of the atmosphere. The results of this research are an indication that by using an iterative reconstruction algorithm, it is feasible to reconstruct diffraction-limited images from the Fourier modulus (or autocorrelation) data provided by stellar speckle interferometry. Experiments were performed on astronomical data. It was necessary to develop methods of compensating for systematic errors and noise in the data. These methods were applied to binary star data, and a diffraction-limited image was successfully reconstructed from the resulting Fourier modulus data. The uniqueness of images reconstructed from Fourier modulus data was explored using the theory of analytic functions. It was shown, among other things, that if an object or its autocorrelation consists of separated parts satisfying certain disconnection conditions, then it is usually uniquely specified by its Fourier modulus. A new method was developed for reconstructing the support of an object from the support of its autocorrelation; it involves taking the intersection of three translates of the autocorrelation support. For objects consisting of a number of separated points, a new method was developed for reconstructing the object. Author (GRA)

N81-23895# Technology Service Corp., Santa Monica, Calif.
SENSOR IMAGE PREDICTION TECHNIQUES Final Technical Report
Anthony J. Stenger, Warren R. Stone, Lilly Berry (California Univ., Los Angeles), and Thomas J. Murray (California Univ., Los Angeles) Feb. 1981 104 p refs
(Contract F30602-78-C-0054; AF Proj. 6244)
(AD-A097638; TSC-PD-B589-1; RADC-TR-80-388) Avail: NTIS HC A06/MF A01 CSCL 05/8

The preparation of prediction imagery is a complex, costly, and time consuming process. Image prediction systems which produce a detailed replica of the image area require the extensive Defense Mapping Agency data base. The purpose of this study was to analyze the use of image predictions in order to determine whether a reduced set of more compact image features contains enough information to produce acceptable navigator performance. A job analysis of the navigator's mission tasks was performed. It showed that the cognitive and perceptual tasks he performs during navigation are identical to those performed for the targeting mission function. In addition, the results of the analysis of his performance when using a particular sensor can be extended to the analysis of this mission tasks using any sensor. An experimental approach was used to determine the relationship between navigator performance and the type of amount of information in the prediction image. A number of subjects were given image predictions containing varying levels of scene detail and different image features, and then asked to identify the predicted targets in corresponding dynamic flight sequences over scenes of cultural, terrain, and mixed (both cultural and terrain) content. GRA

N81-23896# Rome Air Development Center, Griffiss AFB, N.Y.
WAVELENGTH DIVISION MULTIPLEXING: OVERVIEW OF THE STATE OF THE ART
Eric Rickard Mar. 1981 35 p refs
(AF Proj. 4519)
(AD-A097587; RADC-TR-81-47) Avail: NTIS HC A03/MF A01 CSCL 20/6

This report provides an evaluation of the different design techniques for Wavelength Division Multiplexing. Heavy emphasis is placed upon the physical techniques for performing optical demultiplexing. The report includes illustrations and data on different design components along with the pros and cons of each. Also included are future considerations for the design and implementation of Wavelength Division Multiplexing techniques in the fiber optic industry. Author (GRA)

N81-23897# Naval Ocean Systems Center, San Diego, Calif. Ocean Technology Dept.
HIGH-PRESSURE VIEWPORTS FOR INFRARED SYSTEMS. PHASE 1: GERMANIUM Final Report, 9 Oct. - Sep. 1980
Jerry D. Stachiw Sep. 1980 122 p
(AD-A097089; NOSC/TR-565) Avail: NTIS HC A06/MF A01 CSCL 17/5

Spherical sectors fabricated from polycrystalline germanium can serve successfully as pressure-resistant windows in IR systems in the marine environment. Spherical sectors and included spherical angle withstood 100 pressure cycles from 0 to 20000 psi without cracking when tested hydrostatically in a compliant metallic mounting with an inclined seat protected by elastomeric gaskets. Nylon cloth-reinforced Neoprane and Kelvar-49-reinforced epoxy gaskets performed successfully provided that the bearing stress did not exceed 20000 psi for Neoprene and 60000 psi for epoxy gaskets. The average flexural and compressive short-term

strengths of germanium under uniaxial loading were found to be in the 70000 to 15000 psi ranges, respectively. Germanium also exhibits static fatigue under sustained flexure loading in the marine environment. The static fatigue limit for sustained loading of 1000 hour duration in a seawater environment was found to be in the 8000 to 10000 psi range. Germanium was found to also to exhibit the Kaiser effect even though it is only a rather weak emitter of acoustic emissions under compressive loading. It appears that recording of acoustic emissions during a structural proof test could be incorporated into the quality assurance program for germanium lenses and windows where it would complement visual inspection for the presence of incipient cracks. GRA

N81-23898# Los Alamos Scientific Lab., N. Mex.
ULTRAVIOLET PHASE CONJUGATION AND ITS PRACTICAL IMPLICATIONS
B. J. Feldman, Robert A. Fisher, and S. L. Shapiro 1980 6 p refs Presented at the 3rd Intern. Conf. on Lasers and Appl., New Orleans, 15 Dec. 1980
(Contract W-7405-eng-36)
(LA-UR-81-145; CONF-801201-8) Avail: NTIS HC A02/MF A01

A demonstration UV phase conjugation is reported. Using a 15 psec, 2660 A pulse, 0.1 percent conjugate reflectivities were obtained via degenerate four wave mixing in 1 mm samples of CS2 mixtures. While pure CS2 did not exhibit the effect, dilution in several UV transmitting solvents opened up a concentration tunable (2450 A to 2850 A) spectral window, allowing the optical Kerr effect to be utilized. Weaker phase conjugation at 2660 A was also observed in other Kerr media and in saturable absorber media. DOE

N81-23899# Oak Ridge National Lab., Tenn.
ION EXTRACTION AND OPTICS IN THREE DIMENSIONS
J. W. Wooten, D. H. McCollough, R. W. McCaffey, L. J. Drooks, J. H. Whealton, and J. E. Akin Mar. 1981 32 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7691) Avail: NTIS HC A03/MF A01

An algorithm is described for a solution to the three-dimensional (3-D) Poisson-Vlasov equations for ions extracted from a plasma. A variational formulation of Poisson's equation using isoparametric finite elements leads to a band matrix, which is solved by a modified Gauss-Cholesky method. A semi-implicit method is described for the inclusion of nonlinear plasma electrons, allowing an explicit solution of the extraction sheath. An intrinsically 3-D example is shown. DOE

N81-24009*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
MAXIMIZING THROUGHPUT OVER AN AVERAGE-POWER-LIMITED AND BAND-LIMITED OPTICAL PULSE POSITION MODULATION CHANNEL
D. Zwillinger *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 81-86 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20F

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N81-23900*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EVALUATION OF MAGNETIC HELICITY IN HOMOGENEOUS TURBULENCE
William H. Matthaeus, M. L. Goldstein, and C. Smith (College of William and Mary, Williamsburg, Va.) Apr. 1981 15 p refs Submitted for publication
(NASA-TM-82131) Avail: NTIS HC A02/MF A01 CSCL 20I

A technique for the measurement of magnetic helicity from values of the two point magnetic field correlation matrix under the assumption of spatial homogeneity is presented. Knowledge of a single scalar function of space, derivable from the correlation matrix, suffices to determine the magnetic helicity. The technique is illustrated by reporting the first measurement of the magnetic helicity of the solar wind. J.M.S.

N81-23901# General Atomic Co., San Diego, Calif.
ONETWO: A COMPUTER CODE FOR MODELING PLASMA TRANSPORT IN TOKAMAKS
W. W. Pfeiffer, R. H. Davidson, R. L. Miller, and R. E. Waltz Dec. 1980 201 p
(Contract DE-AT03-76ET-51011; GEN. ATOMIC Proj. 3235)
(GA-A-16178) Avail: NTIS HC A10/MF A01

ONETWO is a one-and-a-half-dimensional, time dependent computer code for modeling plasma transport in Tokamaks. Both circular and noncircular cross section plasmas, including doublets, are modeled along with currents in field shaping coils. Electrons, several species of ions, and two species of neturals are considered simultaneously. The electrons and ions are treated as fluids, while the neutrals are treated kinetically. Neoclassical and several anomalous transport models are available. Important physical processes that produce sources and sinks of particles and energy are also considered, including ohmic heating, electron-ion energy exchange, radiation, neutral transport (and gas puffing), neutral beam heating, RF heating, pellet fueling, and fusion. DOE

N81-23902# Stanford Univ., Calif. High Temperature Gasdynamics Lab.
HIGH MAGNETIC FIELD MHD GENERATOR PROGRAM Annual Report, 1 Oct. 1979 - 30 Sep. 1980
Oct. 1980 204 p refs
(Contract DE-AC01-80ET-15611)
(DOE/ET-15611/3) Avail: NTIS HC A10/MF A01

The MHD channel phenomena which are important at high magnetic fields are investigated. Nonuniformity effects, boundary layers, Hall field breakdown, the effects on electrode configuration and current concentrations, and studies of steady state combustion disk and linear channels in an existing 6 Tesla magnet of small dimensions are discussed. In the study of the effects of nonuniformities and instabilities, theoretical models were developed and tested against available data. Boundary layer measurements and calculations of velocity, temperature, and electron density were systematically assessed; by accounting for the effect of free stream turbulence, good agreement is obtained between measurement and theory. An improved laser Doppler anemometer was developed for turbulence damping and velocity profile measurements. DOE

N81-23903# Wisconsin Univ., Madison.
HIGH POWER ICRH EXPERIMENTS ON THE WISCONSIN LEVITATED OCTUPOLE
E. J. Strait, C. M. Fortgang, J. C. Twichell, R. N. Dester, J. C. Sprott, and J. D. Barter Dec. 1980 6 p refs Presented at the 4th Topical Conf. on Radio Frequency Plasma Heating, Austin, Tex., 9-10 Feb. 1981 Prepared in cooperation with TRW Systems, Redondo Beach, Calif.
(DOE/ET-53051/15; CONF-810214-2) Avail: NTIS HC A02/MF A01

Preliminary ICRH experiments on the Wisconsin Levitated Octupole are described. In order to study heating, energy confinement, and high beta plasmas, a 1.8 to 3 MHz oscillator and antenna was installed. The oscillator is capable of delivering 2 MW of RF power for 10 msec. At a density 6 x 10 to the 12th power cm (-3), T sub e reaches a maximum of 30 eV as measured by Langmuir probes and VUV spectroscopy. Charge exchange measurements of T sub i show Maxwellian components at 95 and 190 eV, with an energy confinement time of approx. 1 msec. Electron energy confinement is limited by impurity radiation, and several methods of impurity control are being tested. Experiments also include direct measurement of the RF electric field, antenna loading measurements, variation of the oscillator frequency, and ohmic heating of the electrons. DOE

N81-23904# Los Alamos Scientific Lab., N. Mex.
X-RAY DIODES FOR LASER FUSION PLASMA DIAGNOSTICS
R. H. Day, P. Lee, E. B. Salloman, and D. J. Nagel Feb. 1981 24 p refs
(Contract W-7405-eng-36)
(LA-7941-MS) Avail: NTIS HC A02/MF A01

Photodiodes with X-ray sensitive photocathodes used as broadband X-ray detectors in fusion plasma diagnostics are discussed. The risetime of the detector system and the quantum efficiency between 1 to 500 A of numerous photocathode materials of practical interest were measured. The materials studied included aluminum, copper, nickel, gold, three forms of carbon, chromium, and cesium iodide. The results of the measurements are compared with Henke's semiempirical model of photoyield. The effects of long-term cathode aging were studied. In addition, the X-ray mass-absorption coefficient of several ultrasoft X-ray windows were measured in energy regions where data were unavailable. Windows studied were made of aluminum, Formvar, polypropylene, and Kimfoil. DOE

N81-23905# Oak Ridge National Lab., Tenn. Dept. of Nuclear Engineering.

EXPERIMENTAL INVESTIGATION OF SOLID HYDROGEN PELLET ABLATION IN HIGH-TEMPERATURE PLASMAS USING HOLOGRAPHIC INTERFEROMETRY AND OTHER DIAGNOSTICS Ph.D. Thesis

Clarence Earl Thomas, Jr. Mar. 1981 238 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7486) Avail: NTIS HC A11/MF A01

Design details are presented for a holographic interferometer/shadowgraph used to study the microscopic characeteristics of a solid hydrogen pellet ablating in an approx. 1-keV plasma. Experimental data are presented for two sets of experiments in which the interferometer/shadowgraph was used to study approx. 1-mm-diam solid hydrogen pellets injected into the Impurity Study experiment (ISX-B) Tokamak at velocities of 1000 m/s. In addition to the use of the holographic interferometer, the pellet ablation process is diagnosed by studying the emission of Balmer-alpha photons and by using the available Tokamak diagnostics (Thomson scattering, microwave/far-infrared interferometer, pyroelectric radiometer, hard X-ray detector). DOE

N81-23906# Oak Ridge National Lab., Tenn. Fusion Energy Div.

TENSOR PRESSURE TOKAMAK EQUILIBRIUM AND STABILITY Ph.D. Thesis

W. Anthony Cooper Mar. 1981 162 p ref
(Contract W-7405-eng-26)
(ORNL/TM-7120) Avail: NTIS HC A08/MF A01

The equilibrium and magnetohydrodynamic (MHD) stability of Tokamaks with tensor pressure are investigated. In particular, the effects of anisotropies induced by neutral beam injection are examined. Perpendicular and parallel beam pressure components beam pressure components are evaluated by taking moments of a distribution function obtained from the solution of a Fokker-Planck equation that models the injection of high energy neutral beams into a Tokamak. D-shaped beam-induced tensor pressure equilibria is numerically generated. A double adiabatic energy prinicple is derived from a modified version of the guiding center plasma energy principle. Finally, the tensor pressure ballooning mode equation is applied to computed equilibria that model experimentally determined ISX-B discharge profiles with high-power neutral beam injection. It is predicted that the plasma is unstable to flutelike modes in the central core of the discharge as a result of the pressure profile peakedness induced by the beams. DOE

N81-23907# Argonne National Lab., Ill.

D-D TOKAMAK REACTOR STUDIES

K. E. Evans, Jr., C. C. Baker, J. N. Brooks, D. A. Ehst, P. A. Finn, J. Jung, R. F. Mattas, B. Misra, D. L. Smith, and H. C. Stevens Nov. 1980 111 p refs
(Contract W-31-109-eng-38)
(ANL/FPP/TM-138) Avail: NTIS HC A06/MF A01

A Tokamak D-D reactor design, utilizing the advantages of a deuterium-fueled reactor but with parameters not unnecessarily extended from existing D-T designs, is presented. Plasma engineering, first-wall/blanket/shield design, magnet design, and tritium/fuel/vacuum requirements are discussed. Conclusions concerning D-D Tokamak reactors are stated. DOE

N81-23908# Argonne National Lab., Ill.

GPSAP/V2 WITH APPLICATIONS TO OPEN-CYCLE MHD SYSTEMS

Howard K. Geyer Jan. 1981 235 p refs
(Contract W-31-109-eng-38)
(ANL/MHD-80-15) Avail: NTIS HC A11/MF A01

A systems analysis technique for analyzing lumped component systems is presented. The computer coding is generated by employing simple preprocessor statements to establish system configurations, constraints, and objective functions. A hybrid equation solver and a sequential programming method for solving constrained optimization problems are described. Recursive calling capabilities are used in both equation solver and optimizer. The build up Jacobians and Hessians of the constraints and objective functions are retained, reducing computing time during parameter studies. A collection of simple first order models for analysis of open cycle magnetohydrodynamics (MHD) power plant applications is presented. Simple MHD system configurations are presented and analyzed. J.D.H.

N81-23909# Language Services, Knoxville, Tenn.

OPTIMIZATION OF A HIGH-VOLTAGE PLASMA FOCUS MACHINE

Lutz Flemming 17 Feb. 1981 99 p refs Transl. into ENGLISH of Rept., Inst. fur Plasmaforschung der Univ. Stuttgart Prepared for Sandia National Labs., Albuquerque, N.M.
(Contract DE-AC04-76DP-00789)
(SAND-81-6005) Avail: NTIS HC A05/MF A01

Optimal design and operating parameters of a high voltage plasma focus device are investigated. The parameters investigated were deuterium filling pressure, length of the inner and outer electrodes, radius of the inner and outer electrodes, and structure and material of the electrodes. Two prototype electrode configurations are presented. The operation of the device during the compression phase, phase of maximum density, quiescent phase, unstable phase, and the decay phase are described. Results of the parameter investigation experiments and analysis of conditions providing maximum neutron yields are presented. J.D.H.

N81-23910# California Univ., Berkeley. Lawrence Berkeley Lab. Accelerator and Fusion Research Div.

PARTICLE SIMULATION CODE FOR LONGITUDINAL DYNAMICS OF HEAVY ION BEAMS

A. Sternlieb, L. Smith, L. J. Laslett, J. Bisognano, and I. Haber Jan. 1981 16 p refs Prepared in cooperation with Naval Research Lab., Washington, D.C.
(Contract W-7405-eng-48)
(LBL-12205) Avail: NTIS HC A02/MF A01

A computer program is presented for describing the longitudinal motion of charged particles in a nonneutralized beam. The code is 1-d, electrostatic, and is capable of simulating coasting or bunched beams, cold or warm, with arbitrary wall impedance. External focusing forces are introduced in the bunched beam case. A variety of distribution functions can be represented. The code is self consistent and it can follow both the linear and nonlinear evolution of a beam. DOE

N81-23911# Virginia Univ., Charlottesville. Dept. of Chemistry.

GLOW DISCHARGE AS AN ATOMIZATION AND IONIZATION DEVICE Progress Report, 1 May 1980 - 1 Feb. 1981

Willard W. Harrison 1981 9 p refs
(Contract DE-AS05-80ER-10635)
(DOE/ER-10635/T1) Avail: NTIS HC A02/MF A01

Glow discharge ion sources are discussed, including ion source design, the effect of magnetic fields on discharge operation, influence of magnetic fields on ion sampling, and the disc cathode source. DOE

N81-23912# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.

QUANTITATIVE MEASUREMENTS IN LASER-INDUCED PLASMAS USING OPTICAL PROBING Final Report

Donald W. Sweeney Jan. 1981 27 p refs
(Contract DE-AS02-76DP-40048)
(COO-4001-8) Avail: NTIS HC A03/MF A01

Optical probing of laser induced plasmas can be used to quantitatively reconstruct electron number densities and magnetic fields. Numerical techniques for extracting quantitative information from the experimental data are described. A computer simulation

of optical probing is used to determine the quantitative information that can be reasonably extracted from real experimental interferometric systems to reconstruct electron number density distributions. An example of a reconstructed interferogram shows a steepened electron distribution due to radiation pressure effects. DOE

N81-23913# Princeton Univ., N. J. Plasma Physics Lab.
LIMITING BETA OF STELLARATORS WITH NO NET CURRENT
H. R. Strauss (New York Univ., New York) and D. A. Monticello Jan. 1981 35 p refs
(Contract DE-AM02-76CH-03075)
(PPPL-1738) Avail: NTIS HC A03/MF A01

Reduced nonlinear MHD equations were used to find finite beta, resistive, 1 = 2 stellarator equilibria with no net current. The stability to low mode number internal MHD modes were investigated and beta limits comparable to Tokamaks were found. Low shear equilibria appear to be substantially more stable than high shear. DOE

N81-23914# Massachusetts Inst. of Tech., Cambridge. Nuclear Reactor Lab.
ALLOY DEVELOPMENT FOR IRRADIATION PERFORMANCE IN FUSION REACTORS Annual Report, Sep. 1979 - Sep. 1980
O. K. Harling and N. J. Grant Dec. 1980 117 p refs
(Contracts DE-AS02-78ER-10107; ER-78-S-02-5098)
(DOE/ER-10107/1; MITNRL-006) Avail: NTIS HC A06/MF A01

The development of improved structural alloys for the fusion reactor first wall application is addressed. Several new alloys were produced by rapid solidification. Emphasis in alloy design and production was placed on producing austenitic Type 316SS with fine dispersions of TiC and Al2O3 particles. Results of mechanical and microstructural tests are presented. A number of neutron irradiations were initiated on samples fabricated from alloys produced. A dual beam, heavy ion, and helium ion, irradiation was completed using several alloys and a range of temperatures, damage rates, and total doses. Modeling of irradiation phenomena was continued with emphasis on understanding the effect of recoil resolution on relatively stable second phase particles. The microstructure of several ZrB2 doped stainless steels was characterized. DOE

N81-23915# Argonne National Lab., Ill. Fusion Power Program.
WAVE-DRIVER OPTIONS FOR LOW-ASPECT-RATIO STEADY-STATE TOKAMAK REACTORS
David A. Ehst Feb. 1981 29 p refs
(Contract W-31-109-eng-38)
(ANL/FPP/TM-141) Avail: NTIS HC A09/MF A01

Low aspect ratio designs are proposed for steady state Tokamak reactors. Benefits stem from reduced major radius and lessened stresses in the toroidal field coils, resulting in possible cost savings in the Tokamak construction. In addition, a low aspect ratio (A = 2.6) permits the application of a bundle divertor capable of diverting 3-T fields to a power reactor using STARFIRE technology. Such a low aspect ratio is possible with the elimination of poloidal field coils in the central hole of the Tokamak, which implies a need for noninductive current drive. Several plasma waves are considered for this application, and it appears likely that a candidate can be found which reduces the electric power for current maintenance to an acceptable value. DOE

N81-23916# Brookhaven National Lab., Upton, N. Y. Physics Dept.
THEORETICAL IMPLICATIONS ON ISABELLE PHYSICS
Ling-Lie Chau Wang 1980 44 p refs Presented at the 18th Course: The High Energy Limit, Erice, Italy, 31 Jul. - 13 Aug. 1980
(Contract DE-AC02-76CH-00016)
(BNL-28825; CONF-800778-3) Avail: NTIS HC A03/MF A01

A brief historical review of the development of understanding of the weak interaction and its final unification with electromagnetic theory is given. The production cross sections in hadronic scatterings are estimated; CVC, scaling, Drell-Yan model, structure functions and perturbative QCD, sigma sub w, sigma sub z, and production rate are aspects considered. The detection of the Z(0) and w(+-) in leptonic decay and hadronic decay is discussed, along with some detail features of the Drell-Yan model. An estimate of the onia production is given, and the Higgs boson and the technicolor pseudoscalar production are considered. DOE

N81-23917# Los Alamos Scientific Lab., N. Mex.
COMPACT TOROIDS GENERATED BY A MAGNETIZED COAXIAL SOURCE IN THE CTX EXPERIMENT
A. R. Sherwood, I. Henins, H. W. Hoida, T. R. Jarboe, K. F. McKenna, R. K. Linford, J. Marshall, and D. A. Platts 1981 10 p refs Presented at the US/Japan Joint Workshop on Compact Toroids, Osaka, Japan, 17-19 Feb. 1981
(Contract W-7405-eng-36)
(LA-UR-81-325; CONF-810212-2) Avail: NTIS HC A02/MF A01

Compact toroids (CT) containing both toroidal and poloidal magnetic field (Spheromak-type) were generated using a magnetized coaxial plasma gun. These CTs tear loose from the gun by magnetic field line reconnection, and they are trapped in flux conservers having various geometries. In a straight cylindrical flux conserver the CTs are observed to be unstable to a gross tilting mode. Stability to the tilting mode was demonstrated in flux conservers having an oblate trapping region; however, the geometry of the entrance region leading to the trapping volume can also have important effects. Lifetimes of about 150 microsec. for the CTs are typically observed. The use of a snipper coil is observed to speed up the magnetic field reconnection process by about a factor of two. DOE

N81-23918# Los Alamos Scientific Lab., N. Mex.
STABLE HEATING AND BURN SIMULATIONS OF A REVERSED-FIELD PINCH REACTOR
R. W. Moses, Jr., R. A. Nebel (Illinois Univ.), and G. H. Miley (Illinois Univ.) 1980 7 p refs Presented at the 2nd Joint Grenoble-Varenna Intern. Symp. on Heating in Toroidal Plasmas, Como, Italy, 3 Sep. 1980
(Contracts DE-AS02-76ET-5204; W-7405-eng-36)
(COO-2218-189; CONF-800932-7) Avail: NTIS HC A02/MF A01

On the basis of results from a one-dimensional transport and stability code, an ideal MHD stable startup and burn procedure is described. Pitch programming and a gas feed at the wall are used. This adiabatic startup is characterized by a high pitch near the minor axis and hollow current and pressure profiles. Ideally, it would be possible to have a reactor startup and burn without highly turbulent processes to deposit excessive amounts of energy on the wall. Potential problems of resistive instabilities and plasma-wall interactions are discussed. DOE

N81-23919# California Univ., Davis. Dept. of Mechanical Engineering.
RESEARCH ON THE HYLIFE LIQUID FIRST WALL CONCEPT FOR FUTURE LASER FUSION REACTORS Final Report
Myron A. Hoffman, Henry R. Asare, Robert Monson, and R. K. Takahashi Sep. 1980 39 p refs
(Contract W-7405-eng-48)
(UCRL-15314; FR-5) Avail: NTIS HC A03/MF A01

The concept of utilizing a curtain of fluid wall of lithium jets to protect the structural walls of a laser fusion reactor was investigated. Experiments were performed on planar sheet water jets issuing vertically downward from slit nozzles. The nozzles were subjected to transverse forced harmonic excitation to simulate the vibrational environment of the laser fusion reactor, and experiments were run at both 1 atm and at lower ambient pressures. Linear temporal stability theory is shown to predict the onset of the unstable regime and the initial spatial growth rates quite well for the cases where the amplitudes of the nozzle vibration are not too large and the waveform is nearly sinusoidal. Both the linear theory and a simplified trajectory theory are shown to predict the initial wave envelope amplitudes very well. For larger amplitude nozzle excitation, the waveform becomes highly nonlinear and nonsinusoidal and can resemble a sawtooth waveform in some cases; these latter experimental results can only be partially explained by existing theories. DOE

N81-23920# California Univ., Livermore. Lawrence Livermore Lab.
PLASMAS IN PARTICLE ACCELERATORS: ADIABATIC THEORIES FOR BUNCHED BEAMS
J. W. K. Mark 3 Mar. 1981 20 p refs
(Contract W-7405-eng-48)
(UCID-18947) Avail: NTIS HC A02/MF A01

Three different formalisms for discussing Vlasov's equation for bunched beam problems with anharmonic space charge forces are outlinted. These correspond to the use of a drift kinetic equation averaged over random betatron motions; a fluidkinetic adiabatic regime analogous to the theory of Chew, Goldberger, and Low; and an adiabatic hydrodynamic theory. DOE

N81-23921# Los Alamos Scientific Lab., N. Mex.
PLASMA PHYSICS PLOTTING PACKAGE
Deborah H. Hyman Feb. 1981 134 p
(Contract W-7405-eng-36)
(LA-8161-M) Avail: NTIS HC A07/MF A01

A package of plotting routines that do up to six two or three dimensional plots on a frame with minimal loss of resolution is described. The package now runs on a PDP-10 with PLOT-10 TCS primitives and on a Control Data Corporation-7600 and a Cray-1 with TV80LIB primitives on the National Magnetic Fusion Energy Computer Center network. The package is portable to other graphics systems because only the primitive plot calls are used from the underlying system's graphics package. DOE

N81-23922# California Univ., Livermore. Lawrence Livermore Lab.
FUSION COMPONENT DESIGN FOR THE MOVING-RING FIELD-REVERSED MIRROR REACTOR
G. A. Carlson 28 Jan. 1981 50 p refs Submitted for publication
(Contract W-7405-eng-48)
(UCID-18916) Avail: NTIS HC A03/MF A01

This partial report on the reactor design contains sections on the following: (1) burner section magnet system design, (2) plasma ring energy recovery, (3) vacuum system, (4) cryogenic system, (5) tritium flows and inventories, and (6) reactor design and layout. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N81-23923 Pennsylvania State Univ., University Park.
CRYSTALLITE SIZES IN POLYETHYLENE SINGLE CRYSTALS AND MELT-CRYSTALLIZED POLYETHYLENE SAMPLES Ph.D. Thesis
Jacob Lahuani 1980 141 p
Avail: Univ. Microfilms Order No. 8107596

The measurement of crystallite size of polyethylene (PE) single crystals and melt crystallized PE is discussed. X-ray line broadening experiments on dried and wet PE single crystals indicate the following: crystallite size in dried PE single crystals can be explained on the basis of mosaic blocks whereas, crystallite size in wet PE single crystals can be explained based on geometrical limitations or the upper limit model. X-ray line broadening measurements of isothermally melt crystallized PE samples indicate that crystallite sizes in these samples could be explained based on by the mosaic block model or distortion in lamellae. Moreover, crystallite sizes and paracrystalline distortion values of these samples are independent of crystallization temperature and/or crystallization time. Dissert. Abstr.

N81-23924*# Honeywell Electro-Optics Center, Lexington, Mass.
DEFECT CHEMISTRY AND CHARACTERIZATION OF Hg(1-X)Cd(X)Te Semiannual Technical Report, Jan. 1979 - Jun. 1980
H. R. Vydyanath [1981] 105 p refs
(Contract NAS8-33245)
(NASA-CR-161746) Avail: NTIS HC A06/MF A01 CSCL 20L

Undoped mercury cadmium telluride crystals were subjected to high temperature equilibration at temperatures ranging from 400 C to 655 C in various Hg atmospheres. Hall effect and mobility measurements were carried out on the crystals quenched to room temperature subsequent to the high temperature equilibration. The variation of the hole concentration in the cooled crystals at 77 K as a function of the partial pressure of Hg at the equlibration temperatures, together with a comparison of the hole mobility in the undoped samples with that in the copper and phosphorous doped samples yielded a defect model for the undoped crystals, according to which, the undoped crystals are essentially intrinsic at the equilibration temperatures and the native acceptor defects are doubly ionized. Native donor defects appear to be negligible in concentration, implying that the p to n conversion in these alloys is mainly due to residual foreign donor impurities. The thermodynamic constants for the intrinsic excitation process as well as for the incorporation of the doubly ionized native acceptor defects in the undoped crystals were obtained. A.R.H.

N81-23925*# Honeywell Electro-Optics Center, Lexington, Mass.
DEFECT CHEMISTRY AND CHARACTERIZATION Hg(1-X)Cd(X)Te Semiannual Technical Report, 1 Jul. - 31 Dec. 1980
H. R. Vydyanath and J. C. Donovan [1981] 29 p refs
(Contract NAS8-33245)
(NASA-CR-161755; Rept-8103-01) Avail: NTIS HC A03/MF A01 CSCL 20L

Iodine doped single crystal samples of mercury cadmium telluride were annealed at temperatures varying from 450 C to 600 C in Hg vapor and quenched to room temperature. Hall effect measurements at 77 K on the crystals cooled to room temperature indicate the samples to be n-type after anneals at high Hg pressures whereas they turn p-type after anneals at low Hg pressures; the electron concentration increases with increase in Hg pressure. The results are explained on the basis that the crystals are saturated with (Hg,Cd)I2, with a fraction of the iodine being present as donor occupying tellurium lattice sites and a fraction being present as acceptors resulting from the iodine on tellurium lattice sites pairing with the doubly ionized native acceptor defects. The solubility of the donor species increases with increase in Hg pressure, whereas that of the acceptor species increases with decrease in Hg pressure. Equilibrium constants for the incorporation of the iodine species as well as the pairing reaction were established. Author

N81-23926*# Old Dominion Univ., Norfolk, Va.
MODELING OF THIN-FILM GaAs GROWTH Progress Report, 1 Feb. - 15 May 1981
John H. Heinbockel May 1981 4 p refs
(Grant NAG1-148)
(NASA-CR-164317) Avail: NTIS HC A02/MF A01 CSCL 20L

Efforts to produce a Monte Carlo computer program for the analysis of crystal growth are briefly discussed. A literature survey was conducted of articles relating to the subject. A list of references reviewed is presented. M.G.

N81-23927# Wisconsin Univ. - Madison. Materials Science Center.
LOW-ENERGY ELECTRON DIFFRACTION STUDY OF THE SURFACE-DEFECT STRUCTURE Ge GROWN EPITAXIALLY ON GaAs(110)
H. M. Clearfield, D. G. Welkie, and M. G. Lagally 10 Feb. 1981 10 p refs Submitted for publication
(Contract N00014-77-C-0474; NR Proj. 322-072)
(AD-A097599; TR-6) Avail: NTIS HC A02/MF A01 CSCL 20/2

This abstract summarizes initial results of an investigation of the surface defects in Ge films grown epitaxially on cleaved GaAs(110). Most of the effort has centered on characterizing the electronic properties of the interface, i.e., band gap discontinuities, localized bonding, work function changes, and abruptness of the interface. X-ray and ultraviolet photoelectron spectroscopy have been used as the main analytical techniques in these investigations. In summary, we have demonstrated that it is possible to extract quantitative information on structural defects even for (1x1) overlayers using LEED. For epitaxial growth of

Ge on GaAs(110) under the present experimental conditions, the overlayers appear to have a higher concentration of extended defects than the substrates on which they are grown. At low growth temperatures, this may be due to a mechanism that inhibits layer-by-layer growth, causing the surface to be highly stepped. For annealed layers, dislocations grown into the film may propagate to the surface and cause the Ge layer to be polycrystalline but sill oriented. The symmetry of the patterns differs from that observed by Moench and Gant. It is possible that the appearance of superlattices is related to growth mode.
GRA

N81-23928# Antioch Coll., Yellow Springs, Ohio.
MODEL SYSTEMS FOR THE EPITAXIAL GROWTH AND CAPPING OF GaAs Final Report, Feb. 1980 - Jul. 1980
Richard G. Yalman 1980 35 p refs Proposed for presentation at the 5th Intern. Conf. on Vapor Growth and Epitaxy, San Diego, Calif., 19-24 Jul. 1981
(Grant AF-AFOSR-0121-80; AF Proj. 2306)
(AD-A097410; AFOSR-81-0325TR) Avail: NTIS HC A03/MF A01 CSCL 20/2

A computer program has been written for the CVD of epitaxial GaAs and InP in a three bubbler, two boat silica glass reactor using the Ga/AsCl3/H2 and In/PCl3/H2 techniques, respectively. The data bank contains the most recent enthalpy and free energy values. The latter are in the form of polynomials and, where necessary, recalculated from heat capacity or spectroscopic data. The importance of correct enthalpy values for computing As2/As4 ratios and the concentrations of volatile silicon compounds is discussed in detail. Calculations were made by iterative approximations rather than using the minimized total Gibb's free energy method. The difference in these methods is examined. The chemistry of the transport system has been examined in stages in the high temperature source region. Three models are proposed for the flat profile reaction of HCl with the arsenic saturated source material which is covered by a crust of GaAs (or InP). In model I, HCl reacts only with GaAs. In Model II, a series of reactions occur resulting in constant crust throughout the growth period. Additional reactions occur when there is a temperature gradient in the source. Actual experimental data for Ga/As ratios corresponds to a combination of these models. The effect of AsCl3 input, H2-inert gas carrier mixtures and the addition of H2O, O2, and NH3 were studied. The program includes subroutines for intentional dopants. For example, the observed dependency of S-doping on AsCl3 input can be explained by the formation of Ga2S. The program also supplies information regarding supersaturation, i.e., nucleation, as well as relative rates of growth and etching of the epi layer.
Author (GRA)

N81-23929# Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics.
AN EXPERIMENTAL STUDY OF ELECTRONIC STATES AT METAL DIELECTRIC INTERFACES Final Scientific Report
A. J. Sievers 13 Mar. 1981 47 p refs
(Grant AF-AFOSR-3684-78; AF Proj. 2306)
(AD-A097363; AFOSR-81-0334TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

Edges, steps, or dielectric discontinuities on metal surfaces produce two kinds of propagating waves: surface plasmons which are bound to the surface and bulk electromagnetic radiation. Since both waves are coherent, interference effects can be readily observed. A two beam surface interferometer was constructed on the metal surface to demonstrate the interference phenomena and also to provide an interferometric wavelength measurement of infrared surface waves. The geometry appears well suited for heterodyne spectroscopic study of surface states. A second technique, broad band surface electromagnetic wave spectroscopy was also developed. The frequency range investigated so far is from 600 to 1800 per cm. A sharp absorption line near 1000 per cm in a molecular overlayer was used to compare the surface electromagnetic waves (SEW) and surface reflection spectroscopy techniques (SRS). The integrated optical density of the absorption line is an order of magnitude larger with SEW than with SRS, demonstrating conclusively that SEW is the more sensitive technique.
GRA

N81-23930# Motorola, Inc., Phoenix, Ariz. Semiconductor Group.
SEQUENTIAL PURIFICATION AND CRYSTAL GROWTH FOR THE PRODUCTION OF LOW COST SILICON SUBSTRATES Annual Report, 15 Sep. 1979 - 14 Sep. 1980
Ming Liaw and Frank Secco Daragona 1980 81 p refs
(Contract DE-AC02-77CH-00178)
(DOE/SERI-8119/3-4) Avail: NTIS HC A05/MF A01

The objective of this program is to identify and develop low cost processing for fabricating large grain size polycrystalline silicon substrates. Metallurgical grade silicon (MG-Si) which is low cost and abundant for industrial usage was chosen as starting material. However, MG-Si cannot be used directly as substrates for solar cell fabrication for the following reasons: (1) it contains 1 to 2 percent metallic impurities, and (2) it is produced as irregular shapes with a fine grain structure. Various purification techniques have been reported. The techniques being studied under this program use direct methods for the purification of MG-Si. The process uses sequential steps of purification followed by crystal growth. The steps of sequential purification include: (1) leaching of MG-Si charge, (2) phase separation of nonsoluble impurities from molten silicon, (3) reactive gas treatment of molten silicon, (4) liquid liquid extraction (called slagging), and (5) impurity redistribution using ingot pulling. All the purification steps, with the exception of step (1), are performed in a consecutive manner using a crystal puller. The purified ingots will be produced in a desired ingot dimension and further recrystallization is not necessary. The theory and experimental results for each purification technique are presented. The relative effectiveness of the various steps are assessed and the most import step(s) are recommended. Finally the electrical characteristics of solar cells built on a thin epitaxial layer deposited on single pulled MG-Si substrates are discussed and compared to single crystal substrates.
DOE

N81-23931# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
COMPUTER SIMULATION STUDY OF THE STRUCTURE OF VACANCIES IN GRAIN BOUNDARIES
A. Brokman (Hebrew Univ. of Jerusalem), P. D. Bristowe, and R. W. Balluffi Jan. 1981 39 p refs
(Contract DE-AS02-78ER-05002; Grant NSF DMR-78-12804)
(DOE/ER-05002/15) Avail: NTIS HC A03/MF A01

The structure of vacancies in grain boundaries was investigated by computer molecular station employing pairwise potentials. In order to gain an impression of the vacancy structures which may occur generally, a number of variables was investigated including: metal type, boundary type, degree of lattice coincidence and choice of boundary site. In all cases the vacancies remained as distinguishable point defects in the relatively irregular boundary structures. However, it was found that the vacancy often induced relatively large atomic displacements in the core of the boundary. These displacements often occurred only in the direct vicinity of the vacancy, but in certain cases they were widely distributed in the boundary, sometimes at surprisingly large distances.
DOE

N81-23932# Brookhaven National Lab., Upton, N. Y.
NUMERICAL TECHNIQUES FOR LATTICE GAUGE THEORIES
Michael Cruetz 6 Feb. 1981 44 p refs Presented at the 28th Karpacz Winter School of Theoretica Physics, Poland, 19 Feb. - 4 Mar. 1981
(Contract DE-AC02-76CH-00016)
(BNL-29048) Avail: NTIS HC A03/MF A01

The motivation for formulating gauge theories on a lattice is reviewed. Monte Carlo simulation techniques are then discussed for these systems. Finally, the Monte Carlo methods are combined with renormalization group analysis to give strong numerical evidence for confinement of quarks by nonAbelian gauge gields.
DOE

N81-23933# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
INFLUENCE OF GRAIN BOUNDARIES ON THE ELECTRICAL PROPERTIES OF POLYCRYSTALLINE-SILICON FILMS Progress Report, 1980 - 1981
D. G. Ast 1981 114 p refs

(Contracts DE-AS02-76ER-02899; EY-76-02-2899)
(DOE/ER-02899/T2) Avail: NTIS HC A06/MF A01

Electron diffraction experiments on diffusion bonded (welded) boundaries, combined EBIC and high voltage transmission electron microscopy to investigate the correlation between structure and electrical properties, and passivation of the electrical activity of crystal defects with hydrogen are discussed. The electron microscopy experiments established unambiguously that coherent twin boundaries power se are not electrically active. The localized electrical activity observed in coherent twin boundaries is due to the presence of intrinsic dislocations, which are partial dislocations of the Schottky type. However, not all partial dislocations studied were electrically active. These investigations showed further that many of the linear boundaries which were previously assumed to be coherent twin boundaries are second order twins, and that these twins are strongly electrically active. Passivation reduces the activity of some, but not of all defects. Passivation is particularly effective in reducing the electrical activity of deformation induced dislocations, which conceivably have a different core structure from grown-in dislocations. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

N81-23934# Los Alamos Scientific Lab., N. Mex.
DYNAMIC THEORY: A NEW VIEW OF SPACE, TIME, AND MATTER
Pharis E. Williams Dec. 1980 177 p refs
(Contract W-7405-eng-36)
(LA-8370-MS) Avail: NTIS HC A09/MF A01

The theory represents a different approach toward unification of the various branches of physics. The foundation of the theory rests upon generalizations of the classical laws of thermodynamics, particularly Caratheodory's abstract statement of the second law. These adopted laws are shown to produce, as special cases, current theories such as Einstein's General and Special Relativity, Maxwell's electromagnetism, classical thermodynamics, and quantum principles. In addition to this unification, the theory provides predictions that may be experimentally investigated. Some of the predictions are a limiting rate of mass conversion, reduced pressures in electromagnetically contained plasmas, increased viscous effects in shocked materials, a finite self energy for a charged particle, and the possible creation of particles with velocities greater than the speed of light. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N81-23935# Los Alamos Scientific Lab., N. Mex.
CONTINUING EDUCATION THROUGH COMPUTER-AIDED INSTRUCTION
John Fox 1981 10 p Presented at the IEEE Region 6th Conf. on Elect. Eng. Appl. in the Pacific, Honolulu, 1-3 Apr. 1981
(Contract W-7405-eng-36)
(LA-UR-81-82; CONF-810416-1) Avail: NTIS HC A02/MF A01

Computer-aided and managed instruction was incorporated into the continuing education program in the Electronics Division of the Los Alamos National Laboratory. Two Control Data Corporation PLATO terminals were installed in the learning center, and have been providing individualized instruction to the employees for approximately 2 years. Reactions from users and total usage figures indicate that there are advantages to computer-aided instruction. User interaction with a computer assures individual response from a student. The learner must be actively involved in the course and cannot passively allow content to flow by. Complex simulations can be programmed and used in the learning process; thus, expensive equipment can be spared the wear and tear attributed to learners. The breadth of course topics included in the on-line library assures that PLATO has a continuing education offering for most employees. DOE

N81-23156# Association Universitaire pour le Developpement de l'Enseignement et de la Culture en Afrique et a Madagascar, Paris (France).
SYMPHONIE PROGRAM PLANNED FOR IVORY COAST 1979 - 1980 [PROGRAMME PREVISIONNEL SYMPHONIE COTE D'IVOIRE 1979 - 1980]
Regine Thomas *In* CNES Symphonie Symp. 1980 p 775-786 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N81-23936* National Aeronautics and Space Administration, Washington, D. C.
MANAGEMENT: A CONTINUING BIBLIOGRAPHY WITH INDEXES Final Report
Mar. 1981 153 p
(NASA-SP-7500(15)) Avail: NTIS HC A08 CSCL 05A

This bibliography lists 551 reports, articles, and other documents introduced into NASA scientific and technical information system in 1980. Author

N81-23937# Boeing Aerospace Co., Seattle, Wash.
WEAPONS SYSTEM SUPPORT RESOURCES DEMAND PARAMETERS - LOGISTICS Progress Report, Jan. - Dec. 1980
G. A. Walker 1 Feb. 1981 231 p refs
(AD-A097517; D194-10074-2) Avail: NTIS HC A11/MF A01 CSCL 01/3

This document presents preliminary results for Phase 3 of a study to seek ways of developing more accurate measures and weightings to improve resource requirement predictions for operational and emerging weapon systems. These improved measures can then be used on new programs to predict maintenance demands (human and material), for design tradeoff studies early in the system development process to reduce the overall weapon system life cycle cost and increase mission readiness. During Phase 3 (1980) follow-on in-depth statistical analysis of the preliminary findings was performed to identify various subsystem equipment maintenance resource demand vs generic parameter(s) sub-set(s) relationships, such as equipment, operational, environmental, maintenance, and general characteristics. The plan for the second half of Phase 3 (1981) is to further investigate those maintenance resource demands that have strongly correlated impact parameters within the various subsystems and equipments for identification of positive relationships and their cause factors. Author (GRA)

N81-23938# Arinc Research Corp., Annapolis, Md.
THE AIR FORCE NONDESTRUCTIVE INSPECTION MANAGEMENT INFORMATION SYSTEM DEVELOPMENT PROGRAM. PHASE 2: PRELIMINARY DESIGN AND APPROVAL. TASK 1: NDI MAINTENANCE DATA ANALYSIS Interim Report
David E. Franck Mar. 1981 36 p
(Contract F41608-79-D-A014)
(AD-A097669; Rept-2214-21-TR-2409; SA-ALC-MM-006861)
Avail: NTIS HC A03/MF A01 CSCL 05/1

This report summarizes the Task 1 activities of ARINC Research Corporation in support of Phase 2 of the Air Force Nondestructive Inspection (NDI) Program Office (MMEI) at the San Antonio Air Logistics Center (SAALC), Kelly Air Force Base, Texas. These activities, performed as part of Contract F41608-79-D-A014-0004, included an assessment of NDI maintenance

data available via the AFM 66-1 Maintenance Data Collection System (MDCS). The objective of these efforts was to determine the magnitude of NDI maintenance in terms of man-hours expended, the manner in which NDI maintenance is documented, and the number of bases reporting NDI to the MDCS. GRA

N81-23939# Arinc Research Corp., Annapolis, Md.
THE AIR FORCE NONDESTRUCTIVE INSPECTION MANAGEMENT INFORMATION SYSTEM DEVELOPMENT PROGRAM. PHASE 2: PRELIMINARY DESIGN AND APPROVAL. TASK 2: ON-SITE DATA COLLECTION Interim Report
David E. Franck and Robert Barrar Mar. 1981 40 p
(Contract F41698-79-D-A014)
(AD-A097670; Rept-2214-22-TR-2410; SA-ALC-MM-006862)
Avail: NTIS HC A03/MF A01 CSCL 05/1

This report summarizes the Task 2 activities of ARINC Research Corporation in support of Phase 2 of the Air Force Nondestructive Inspection (NDI) Program Office (MMEI) at the San Antonio Air Logistics Center (SAALC), Kelly Air Force Base, Texas. These activities, performed as part of Contract F41608-79-D-A014-0004, included field collection of NDI maintenance data to assess their applicability to a proposed NDI Management Information System. The objective of this task was to monitor NDI maintenance at three selected air bases and document the NDI activities by use of both the current Air Force NDI documentation procedures and NDI maintenance codes proposed in ARINC Research publication 1555-11-1-2068. GRA

N81-23940# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.
ON SENSITIVITY ANALYSIS IN SYSTEMS FOR PLANNING AND DECISION SUPPORT
Andrew P. Sage 1 Jan. 1981 54 p refs
(Contract N00014-80-C-0542; NR Proj. 197-065)
(AD-A097409; UVA/SE-81-1) Avail: NTIS HC A04/MF A01 CSCL 12/2

This paper surveys contemporary research involving error and sensitivity analysis approaches useful for the design of aids for planning and decision support. Discussed are structural sensitivity considerations as well as the effect of errors, for both single and multiattribute cases, in estimation or elicitation of probabilities and utilities. One of the major uses for sensitivity analysis type results is in bounded prioritization of alternatives using ordinal information. This use of sensitivity analysis is discussed and illustrated with examples. Author (GRA)

N81-23941# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.
MULTIPLE OBJECTIVE EVALUATION AND CHOICEMAKING UNDER RISK WITH PARTIAL PREFERENCE INFOMATION
Chelsea C. White, III and Andrew P. Sage 1 Feb. 1981 50 p refs
(Contract N00014-80-C-0542; NR Proj. 197-065)
(AD-A097418; UVA/SE-81-2) Avail: NTIS HC A03/MF A01 CSCL 12/2

In this paper, we consider a single stage, multiattribute decision making problem under risk. Each outcome is associated with a vector of value scores. The set of value score vectors is partially ordered in the usual manner. This partial order is used to induce partial orders on the set of alternatives based on: expected value score, first order stochastic dominance, and second order stochastic dominance. We show that properly aggregating value scores produces a more refined partial order on the set of value score vectors, which then induces a more refined partial order on the alternative set. This result forms the basis of a decision aiding procedure which: (1) identifies the nondominated set of alternatives, a set guaranteed to contain the most preferred alternative under mild assumptions, (2) asks the decision maker to choose a most preferred alternative from the nondominated set, and (3) if this choice cannot be made, aggregates some, but not necessarily all, of the value scores to strengthen the partial order on the alternative set, thus reducing the size of the nondominated set and presumably enhancing alternative selection. The potential value of this procedure is that it is interactive, it can accommodate a variety of levels of online preference feedback from the decision maker, and it does not necessarily require that the value scores by completely aggregated. Author (GRA)

N81-24016*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Control Center Operations.
DSN SCHEDULING SYSTEM
R. Dorham *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 132-141 (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 05A

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N81-23942 Ohio State Univ., Columbus.
THE DESIGN OF COMPUTER BASED INTEGRATED INFORMATION DISPLAYS Ph.D. Thesis
Christine Marie Mitchell 1980 291 p
Avail: Univ. Microfilms Order No. 8107368

The use of a discrete control modelling methodology to design integrated information display systems was examined. To demonstrate its utility, the methodology was used to construct two integrated information displays for a simulated control system. One display system provided a degree of integration by allowing the operator to select subsets of the full array of possible information, based on the needs of the anticipated control action. The other provided dynamic abstraction and reformulation of the data, based on the current system state and the information requirements of the controller. An experiment was conducted in order to test the effect of the information displays on operator performance. The experiment consisted of three different information display conditions, the two integrated displays and a third display which simulated a conventional dedicated information display configuration. Dissert. Abstr.

N81-23943 Case Western Reserve Univ., Cleveland, Ohio.
SELECTION OF SECONDARY KEYS AND INDICES FOR A DATABASE Ph.D. Thesis
Antonio Esteban Kovacevic 1980 154 p
Avail: Univ. Microfilms Order No. 8108317

The problem of selecting secondary keys and indices as a zero one nonlinear programming model is addressed. The ASSIST model is taken as a starting point and base. Specifically, two contributions are made. First, as a front end enhancement, the model is compacted to treat only two types of queries which actually cover the whole spectrum of possibilities, that is, known and ad hoc queries in disjunctive normal form. Second, as a back end enhancement, a heuristic algorithm is developed to produce a close to optimal solution. Several indexing selection problems are solved by using the algorithm. The model here assumes a specific computer operating system although generalizations can easily be made; further, the model assumes that no concatenation among the attributes are explicitly allowed and that the alternative for the use of secondary indices is a sequential file scan. The model handles retrievals, modifications, insertions, and deletions, and considers the cost of index access, index intersection, index union, record access, record evaluation, index maintenance (for modifications queries), and record rewrite (for modification queries). Dissert. Abstr.

N81-23944# American Inst. of Physics, New York.
DATABASE SEARCHING AND DOCUMENT DELIVERY VIA COMMUNICATIONS SATELLITE Final Report
Rita G. Lerner, Colin K. Mick (Applied Communication Research, Inc.), and Daniel Callahan (Applied Communication Research, Inc.)
Jun. 1980 82 p refs
(Grant NSF DSI-77-18052)
(AIP-80-1) Avail: NTIS HC A05/MF A01

An alternative format for publishing and distributing research information, other than the traditional printed journal was tested. A combination of existing technologies provides a rapid and

efficient means of identifying journal articles of interest to individuals, and delivering copies of single articles immediately. The demand for copies of articles prior to journal publications is also investigated. An on-line information system, DIALOG, to search SPIN was used. Requested articles are delivered by facsimile transmitter. Searches and document delivery use either the experimental Communications Technology Satellite (CTS) or telephone lines. The response time of the system to requests for information is excellent. Human factors involved in the acceptance of the information delivery system are also examined. E.A.K.

N81-23945# Battelle Columbus Labs., Ohio.
MECHANICAL PROPERTIES DATA CENTER Annual Report, 1 Jan. - 31 Dec. 1980
Harold Mindlin, Harold Hueck, and Ross Gubiotti Mar. 1981 70 p
(Contract DLA900-79-C-0539)
(AD-A097389; AMMRC-TR-81-16) Avail: NTIS HC A04/MF A01 CSCL 05/2

This report summarizes MPDC activities for the period 1 January 1980 through 31 December 1980, a total of 12 months, under Contract DLA900-79-C-0539. It provides a summary of the scope, objectives, and organization of MPDC, its information processing products, and services, and a discussion of management objectives. The report focuses on the conversion of the mechanical properties data base to the Battelle data base management system and the continuation of the products and services of the Center. Author (GRA)

N81-23946# Department of National Defence, Ottawa (Ontario). Research and Development Branch.
DEFENSE SDI: A USEFUL CURRENT AWARENESS SYSTEM
J. L. Howard and D. A. Ross Sep. 1980 29 p refs In ENGLISH and FRENCH
(AD-A097084; CRAD-TN-1/80) Avail: NTIS HC A03/MF A01 CSCL 05/1

The Directorate of Scientific Information Services (DSIS) is the Department of National Defence agency which acquires, stores, retrieves and distributes defence-related scientific and technological information, especially reports which are classified or limited in distribution. In addition to the physical sciences and engineering, the subject coverage includes social and behavioral sciences and economics relating to military personnel and responsibilities. The SDI (Selective Dissemination of Information) service is the most popular and heavily used service of DSIS. For a general overview of DSIS services please see Ross, 1978. The SDI program is a computerized method of informing users of documents recently published or made available in their area of interest. It can be provided to all members of the defence community including DND contractors, and is provided free of charge to those authorized to use it. The DSIS SDI service is complementary to the National Research Council's CAN/SDI and is essential for users in the defense community wishing to keep abreast of military technological developments because it includes classified and limited material not announced by CAN/SDI. The primary goal of SDI is specificity in the dissemination of scientific, technical, management and social science data. Author (GRA)

N81-23947# Naval Oceanographic Office, Bay St. Louis, Miss.
THE OCEANOGRAPHIC ENVIRONMENTAL REFERENCE SERVICE RETRIEVAL PROGRAM USERS GUIDE Final Report
Richard L. Rein Feb. 1981 39 p
(AD-A097340; NOO-RP-31) Avail: NTIS HC A03/MF A01 CSCL 05/2

Detailed instructions are presented for the retrieval of information from the Oceanographic Environmental Reference Service Data Base, which is accessed by the use of an interactive program. The data base is designed to serve as an inventory of oceanographic data collection efforts and an index to the data collected. Information available on cruises includes cruise number, platform name, sponsoring organization, dates, areas covered and scientist in charge. Data descriptions include position, depth of sample, sampling rate, quantity, measuring device, and points of contact for data retrieval. The data base can be accessed by cruise, data type, WMO area identifier, and world water body. Prompting statements guide the user in the selection of query responses for information retrieval. Author (GRA)

N81-23948# Pattern Analysis and Recognition Corp., Rome, N. Y.
DATA COLLECTION ANALYSIS AND TEST Final Technical Report
Mark R. Nelson Dec. 1980 134 p refs
(Contract F30602-79-C-0176; AF Proj. 681E)
(AD-A097160; PAR-80-58; RADC-TR-80-366) Avail: NTIS HC A07/MF A01 CSCL 09/2

This report discusses the results of an effort to determine an experimental procedure for the collection of data bases to be used in testing and evaluating present and future voice, fingerprint, and signature authentication techniques. Areas covered include how much data and what information should be collected, and how it should be collected and stored. Author (GRA)

N81-23949# Army Construction Engineering Research Lab., Champaign, Ill. Facilities Systems Div.
LIFE-CYCLE COST DATABASE DESIGN AND SAMPLE DATA DEVELOPMENT Interim Report
Robert D. Neathammer Feb. 1981 66 p
(DA Proj. 4A7-62731-AT-41)
(AD-A097222) Avail: NTIS HC A04/MF A01 CSCL 12/1

This report documents the first two phases of a study to design a Life-Cycle Cost (LCC) database that will provide cost-effective procedures for collecting and presenting maintenance and repair (M R) data for Army facilities. The first two phases of the study were (1) problem definition and prior work analysis; and (2) data collection feasibility evaluation. Installation and District designers/planners require different levels of M R data than OCE planners to do their work most effectively. Thus, two databases with different levels of detail are required. Collection of data could be done in two ways: (1) implementing a one-time data collection program at eight installations to collect M R information across age groups of buildings and types of construction; or (2) analyzing Integrated Facilities System (IFS) tapes from a sample group of installations. Because of problems in both of these methods, it was determined tht the best means of obtaining data for a database at the present time is by contract, using engineered performance standards taken from Army publications. GRA

N81-23950# California Univ., Livermore. Lawrence Livermore Lab.
SYSTEM DATA STRUCTURES FOR ON-LINE DISTRIBUTED DATA BASE MANAGEMENT SYSTEM
J. A. Wade 28 Jan. 1981 53 p refs
(Contract W-7405-eng-48)
(UCID-18912) Avail: NTIS HC A03/MF A01

Data structures used in implementing a distributed data base management system (DBMS) for the Mirror Fusion Test Facility are described. The hardware and software frameworks within wwhich the DBMS was developed are first described, followed by a brief look at the motivation and fundamental design goals of the system. The structures are given in detail. DOE

N81-23951# Department of Energy, Washington, D. C. Energy Information Administration.
NATIONAL ENERGY INFORMATION SYSTEM BASIC CONCEPTS
Jul. 1980 26 p
(DOE/EIA-0229) Avail: NTIS HC A03/MF A01

The basic concepts on which the National Energy Information System (NEIS) rests are described and clarified. Identified are the current state of, as well as future information gathering activities of the system. The NEIS was originally created under Congressional mandate to collect, process, and disseminate data useful for analysis of energy supply and consumption issues. An overview of NEIS, data descriptions, metadata (directories, documentation), and procedures of the NEIS system are discussed in a question-and-answer format. DOE

N81-23952# Department of Energy, Washington, D. C. Energy Information Administration.
ENERGY INFORMATION REFERRAL DIRECTORY, FOURTH

QUARTER 1980
1980 170 p
(DOE/EIA-0205(80-4Q)) Avail: NTIS HC A08/MF A01

This directory provides the name, address, and phone number of various energy information offices within the DOE and other Federal agencies. The arrangement is topical. Each entry presents the name of the office, the address, the main contact person, and a summary of the office's primary activities. A comprehensive subject index to the entries is provided as well as a name index. In addition, the publication contains several appendices in which DOE Regional Energy Information Centers, state energy offices, DOE commercialization-resource managers, and DOE research and development and field facilities are listed. Charts illustrate the DOE and the EIA organizational structure. DOE

N81-23953# Los Alamos Scientific Lab., N. Mex. Computing Div.
ONLINE MICROFILM RECORDERS OF LOS ALAMOS NATIONAL LABORATORY
Richard Wolf 1981 15 p refs Presented at the 11th Ann. Computer Output Microfilm Technol. Conf., Lincolnshire, Ill., 24-26 Feb. 1981
(Contract W-7405-eng-36)
(LA-UR-81-284; CONF-810213-1) Avail: NTIS HC A02/MF A01

A satellite graphics output station (PAGES) is developed which accepts user requests for output through a large computer network. The system orders these requests and schedules output on one of several devices consistent with the user's request and the overall job turnaround requirements. The system translates a standard Metafile into a device specific format and efficiently generates the requested output. At the same time, PAGES provides some graphics processing, previously provided by the large supercomputers. The system provides current information on queues, jobs being processed, and the devices. An effective quality control program is an integral part of the system design. This system should continue to reduce user interface changes, hold down operating cost, make effective use of supercomputer time, and produce quality output. DOE

N81-23954# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
THE EXECUTIVES GUIDE TO DATA RESOURCE MANAGEMENT
Dec. 1980 40 p
(PB81-153520) Avail: NTIS HC A03/MF A01 CSCL 05B

Data Resource Management concerns knowledge and management of data and of its composition, sources, dissemination, flow, locations, and uses. It is a management program, supported by a Data Resource Directory system, which applies to the management of data the basic principles of resource management. GRA

N81-23955# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
INFORMATION SERVICES: THEIR ORGANIZATION, CONTROL AND USE
Jan. 1981 79 p refs Partly in ENGLISH and FRENCH Papers presented at the Tech. Inform. Panel Specialists' Meeting, Lisbon, 5-6 Nov. 1980
(AGARD-CP-294; ISBN-92-835-0285-X) Avail: NTIS HC A05/MF A01

The Portuguese scientific and technical information scene was reviewed as was the context of the European information environment. Special emphasis was placed on Euronet and its interlinking with other networks. The subject of external information services, both national and international, are discussed, as are information retrieval and document delivery problems. In-house information services are also discussed. For individual titles, see N81-23956 through N81-23965.

N81-23956# Gesellschaft fuer Information und Dokumentation, Heidelberg (West Germany).
INFORMATION TRANSFER: BARRIERS AND TRENDS
Werner Kunz *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 4 p refs (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

Based on a model of knowledge a concept of information as knowledge alteration is outlined. Problems of transfer of knowledge into new areas of application are described. Strategies for designing 'friendlier' information systems for innovation processes are discussed. Author

N81-23957# Centro de Documentacao Cientifica e Tecnica, Lisbon (Portugal).
PORTUGUESE SCIENTIFIC AND TECHNICAL INFORMATION SCENE: PRESENT STATUS AND FUTURE PROSPECTS
Carlos Pulido *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 5 p refs (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

A definition of an information policy is presented. The existing on-line systems were examined and promotional activities to demonstrate the potential uses of these systems are described. T.M.

N81-23958# National Center for Scientific and Technical Documentation, Brussels (Belgium).
EURONET AND ITS INTERLINKING TO OTHER NETWORKS
Guy M. Vanautryve *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 7 p refs (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

The multidisciplinary data networks for America are compared to the Euronet telecommunications network. User requirements for the network are outlined. The technology selection for the implemention of Euronet is the electronic packet switching technology. The actual network configuration has four packet switching exchanges, established in Frankfurt, London, Paris, and Rome. Remote access facilities are located in Amsterdam, Brussels, Copenhagen, Dublin, and Luxemburg. T.M.

N81-23959# Fachinformationszentrum fuer Energie, Physik, Mathematik G.m.b.H., Eggenstein-Leopoldshafen (West Germany).
NATIONAL INFORMATION SERVICES WITH INTERNATIONAL ORIENTATION
Werner Rittberger *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 5 p refs (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

The information policy of the Federal Republic of Germany is presented and a few examples from other countries illustrated. Besides cooperation in international information systems there is bi- or multilateral cooperation. This kind of cooperation is illustrated by the examples of several data bases. Principles of information policies, economic and legal aspects as well as the experience gained so far are discussed. The problems of information distribution are also briefly dealt with. From the experience gained so far, criteria for national information services with international orientation are outlined. T.M.

N81-23960# Royal Aircraft Establishment, Farnborough (England).
USE OF EXTERNAL INFORMATION SERVICES
Tom Norton *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 6 p refs Revised (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

Services which would be of use to defense-aerospace organization in the U.K. are examined. Sources for report literature, serial publications, translations, and conference proceedings are discussed and the differences between the various sources were examined. Attempts to improve the detection, identification, and collection of nonconventional or 'grey' literature are described. Reasons for continuing to subscribe to printed indexes and abstracts covering fields of major importance to an organization, even when on-line equivalents are available, are discussed. The importance of informal contacts (the 'old boy' network) in making effective use of external information services is emphasized. T.M.

N81-23961# Institut Technique du Batiment et des Travaux Publics, Paris (France). Centre d'Assistance Technique et de Documentation.

ARIANE: BUILDING DATA BANK
Jean Devoge *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 9 p In ENGLISH and in FRENCH (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

The data bank, computerized since 1972, collects all information required by the building professionals (i.e., engineers, foremen, architects,...). The following fields are covered in the data bank: building technology and tools; technical regulations concerning building in France; and building products. The design and use of the ARIANE data bank are described. T.M.

N81-23962# Technology Reports Centre, Orpington (England).
INTRODUCTION OF ON-LINE SEARCHING IN INFORMATION SERVICES
B. A. Kingsmill *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 7 p refs (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

The knowledge and techniques that need to be acquired for effective on-line searching, including operation of the terminal, command languages, system responses, how data bases are implemented, and general search strategy were examined. The various aids available such as manuals, training courses at different levels and different degrees of specialization, and help desks are discussed. The searcher's interaction with the end user of the information was examined. T.M.

N81-23963# Trondheim Univ. (Norway).
SURVEY OF SOLUTIONS TO THE DELIVERY PROBLEMS. GROWTH CONTROL OF LIBRARY COLLECTIONS
Sten F. Vedi *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 2 p (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

Two major solutions are discussed: the concentration of interlending to a few libraries in each country, and planned decentralization. Concentration may be suitable for small countries where there already are substantial collections concentrated in two or three libraries. This is much more cost effective than establishing central loan collections from scratch. Decentralization requires provision of material allocated among libraries on systematic basis, including a cooperative acquisition scheme. T.M.

N81-23964# Atomic Weapons Research Establishment, Aldermaston (England).
LIBRARY RECORDS: IN-HOUSE FILE CREATION VERSUS EXTERNAL SERVICES
David V. Wilson *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 5 p refs (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

A large percentage of the material required in special libraries in the defense field is not recorded in central files. Solutions to this problem are discussed and the use of computers for the creation of files of bibliographical information was reviewed. The transfer of data from an on-line data preparation file to a main off-line book file is outlined. T.M.

N81-23965# Congressional Research Service, Washington, D.C.
INFORMATION SERVICES FOR LEGISLATIVE POLICY MAKING
Robert Lee Chartrand *In* AGARD Inform. Serv.: Their Organ., Control and Use Jan. 1981 11 p refs (For primary document see N81-23955 14-82)
Avail: NTIS HC A05/MF A01

Both legislative and executive decision makers in the United States have become committed to the use of information technology computers, telecommunications, microforms, word processing, audio and video devices which affects virtually every facet of governmental and societal activity. The United States Congress has undertaken to improve the efficiency of its functioning through the creation of new legislative entities and mechanisms which would provide a broad spectrum of responsive information resources and services. The steps by which Congress determined its information needs, defined priorities in terms of files required and specific products or services created, and utilized public and private sector resources to provide the narrative, graphic, or statistical information required for policy making are described. T.M.

N81-24018*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Engineering Sect.
REPORTING CAPABILITIES AND MANAGEMENT OF THE DSN ENERGY DATA BASE
R. D. Hughes and S. T. Boyd *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 147-153 ref (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 05B

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N81-23966# Clemson Univ., S.C. Dept. of Mathematical Sciences.
A COST FUNCTION FOR MILITARY AIRFRAMES
Norman K. Womer May 1980 12 p refs Presented at the 9th Ann. DOD/FAI Acquisition Res. Symp., Annapolis, 9-11 Jun. 1981
(Contract N00014-75-C-0451; NR Proj. 047-202)
(AD-A097538; N122) Avail: NTIS HC A02/MF A01 CSCL 12/1

Recent theoretical and empirical work in the areas of learning curves, production rate and cost estimation of airframes has seemed to yield contradictory conclusions. A model of acquisition process that captures the interaction between learning and both endogenous and exogenous production rate changes is developed by modifying a previous model to include production experience and yearly production targets. This permits a production program to be modeled as a series of discrete tasks connected by experience. The impacts of an exogenous increase or decrease in deliveries, of stretching a lot out over a longer period of time, and of several restrictions on production can be modeled by this procedure. Author (GRA)

N81-23967# Clemson Univ., S.C. Dept. of Mathematical Sciences.
A COST FUNCTION FOR AN AIRFRAME PRODUCTION PROGRAM
Norman K. Womer and Thomas R. Gulledge Aug. 1980 17 p refs
(Contract N00014-75-C-0451; NR Proj. 047-202)
(AD-A097540; N125) Avail: NTIS HC A02/MF A01 CSCL 12/1

This research represents the expansion of previous work in the area of estimating program cost in military airframe production. The effort is unique in that it yields a model of the production process that considers the impact of learning and production rate on total program costs. To provide an empirical test of model validity, the parameters are estimated for the C141 airframe program. The empirical work is instructive in that it shows how particular care must be taken in formulating models of this type. This model should be particularly useful as a prototype for models of on going production programs. In particular, it can be used to estimate the cost impact of exogenous changes in the program delivery schedule, the 'crashes' and 'stretch-outs' that frequently characterize military aircraft programs. Author (GRA)

N81-23968# Technical Research Analysis Co., Falls Church, Va.
DEVELOPMENT OF A MARKET METHODOLOGY FOR ASSESSING THE IMPACT OF SOLAR THERMAL-PRODUCED FUELS AND CHEMICALS
Christina A. Swanson 17 Nov. 1980 50 p refs
(Contract DE-AP03-80SF-12989)
(DOE/SF-12989/1) Avail: NTIS HC A03/MF A01

An attempt was made to determine the potential impacts on the solar thermal industry and on the markets for particular fuels and chemicals of applying solar thermal technology to the production of these fuels and chemicals. The following are covered:

the technical compatibility of Solar Thermal Fuels and Chemicals (ST/FC) processes; the identification of promising ST/FC processes; technical specification and economic evaluation of selected systems; ST/FC market assessments; and identification of strategic options. An overview is presented of oil shale resources, economics, and industry development, and of issues significant to the potential application of solar thermal technology in oil shale retorting. DOE

N81-23969# Battelle Inst., Frankfurt am Main (West Germany).
DEVELOPMENT OF A COMPUTER-AIDED METHOD FOR THE TECHNO-ECONOMIC EVALUATION OF R AND D PROJECTS IN THE MINING AREA. STAGE 1: DEVELOPMENT OF THE CONCEPT AND IDENTIFICATION OF APPLICATION Final Report
Peter Hess, Goetz Schaude, Wolfgang Schneider, and Eberhard Hellermann Dec. 1980 158 p refs
(BMFT-FB-T-80-130; ISSN-0340-7608; BF-R-63.297-1) Avail: NTIS (US Sales only) HC A08/MF A01

Functional, volume and cost structures are described and, as far as possible, company specific characteristics are established which enable the impacts of R and D projects to be evaluated quantitatively. The work was started from the assumption that the evaluation must be based on the problem solutions to be achieved with the R and D projects in question and the impacts to be expected in the user area. Due to the large number of impacts to be assessed, a multidimensional evaluation method was used. A method of utility value analysis is presented. DOE

N81-23970# Clemson Univ., S.C. Dept. of Mathematical Sciences.
SOME PROPOSITIONS ON COST FUNCTIONS
Norman K. Womer Jul. 1980 18 p refs
(Contract N00014-75-C-0451; NR Proj. 047-202)
(AD-A097539; N124) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this paper, a model is developed for a firm producing to an order which specifies a quantity and a delivery date for output. The order serves to constrain a production program which minimizes the discounted cost of producing at a constant output rate. The model is formed by augmenting a homogeneous production function with a learning hypothesis and deriving a cost function. The cost function is then compared to several results due to Alchian, Hirshleifer, and Oi. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N81-23971# Committee on Science and Technology (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1982
Washington GPO 1981 13 p A bill referred to the Comm. on Sci. and Technol., 97th Congr., 1st Sess., 23 Jan. 1981
(H-Rept-97-32) Avail: US Capitol, House Document Room

A bill introduced in the House of Representatives to authorize appropriations to the National Aeronautics and Space Administration for research and development, construction of facilities, research and program management, and other purposes is documented. M.G.

N81-23972# Committee on Science and Technology (U. S. House).
AUTHORIZING APPROPRIATIONS TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION FOR FISCAL YEAR 1982
Washington GPO 1981 228 p Rept. to accompany H.R. 1257 presented by the Comm. on Sci. and Technol. at the 97th Congr., 1st Sess., 8 May 1981
(H-Rept-97-32) Avail: US Capitol, House Document Room

Committee actions, including language amendments, are presented along with committee views of the bill authorizing funds for NASA program management, research and development, and construction of facilities. A.R.H.

N81-23973# Committee on Commerce, Science, and Transportation (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1982
Washington GPO 1981 12 p A bill referred to the Comm. on Com., Sci., and Transportation, 97th Congr., 1st Sess., 4 May 1981
(S-Rept-97-100) Avail: US Capitol, Senate Document Room

Funding is proposed for a variety of NASA and NASA-related research and development projects and programs. Allocations proposed include; space and space vehicles; planetary exploration; test facilities; physics and astronomy; and others. S.F.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N81-23974# Comptroller General of the United States, Washington, D.C.
LEARNING TO LOOK AHEAD: THE NEED FOR A NATIONAL MATERIALS POLICY AND PLANNING PROCESS Report to the Congress
19 Apr. 1979 65 p refs
(EMD-79-30) Avail: NTIS HC A04/MF A01

Major materials issues facing the United States, including availability, price, national security and quality of life, are reviewed. Topics include: information systems; access to materials; materials, energy and the environment; making better use of resources; and planning and administration. S.F.

N81-23975*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
METHODOLOGY FOR URBAN RAIL AND CONSTRUCTION TECHNOLOGY RESEARCH AND DEVELOPMENT PLANNING Final Report
Louis D. Rubenstein, James E. Land, Govind Deshpande, Bain Dayman, and Eugene H. Warren 1 Aug. 1980 163 p refs Sponsored in part by DOT
(Contracts NAS7-100; DOT-AT-800015)
(NASA-CR-164280; JPL-Pub-80-83; UMTA-CA-06-0116-80-3) Avail: NTIS HC A08/MF A01 CSCL 13F

A series of transit system visits, organized by the American Public Transit Association (APTA), was conducted in which the system operators identified the most pressing development needs. These varied by property and were reformulated into a series of potential projects. To assist in the evaluation, a data base useful for estimating the present capital and operating costs of various transit system elements was generated from published data. An evaluation model was developed which considered the rate of deployment of the research and development project, potential benefits, development time and cost. An outline of an evaluation methodology that considered benefits other than capital and operating cost savings was also presented. During the course of the study, five candidate projects were selected for detailed investigation; (1) air comfort systems; (2) solid state auxiliary power conditioners; (3) door systems; (4) escalators; and (5) fare collection systems. Application of the evaluation model to these five examples showed the usefulness of modeling deployment rates and indicated a need to increase the scope of the model to quantitatively consider reliability impacts. S.F.

N81-23976# Ferschl (Michael S.), Milwaukee, Wis.
THE ELECTRIC MOPED
Michael S. Ferschl 26 Feb. 1981 37 p ref
(Contract DE-FG02-79R5-10157)
(DOE/R5-10157/2) Avail: NTIS HC A03/MF A01

Two electrically powered mopeds were designed and built. These vehicles offer single-person transportation which is convenient, quiet, low-cost, smooth, and pollution-free. The first

moped has a 12 volt electrical system. The second has a 24 volt electrical system. They both have top speeds of about 20 miles per hour. They both use transistorized speed controls and deep-discharge, lead-acid batteries. These mopeds were put through a 750 mile test program. In this program, the 12 volt bike had an average range of nine miles. The 24 volt bike, with a smaller battery capacity, had an average range of six miles. DOE

N81-23977# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

PROPANE CONVERSION IN THE VEHICLE FLEET AT THE IDAHO NATIONAL ENGINEERING LABORATORY

John Crone Dec. 1980 10 p
(Contract DE-AC07-76ID-01570)
(EGG-TRANS-5291) Avail: NTIS HC A02/MF A01

One hundred fifty seven pickups, 9 three ton trucks, and 3 jeeps were converted from gasoline to propane. The conversion to propane reduced use of gasoline during the FY 1980 transition period by 111,000 gal, and lowered the fuel cost by $63,000, based on cost of gasohol (which otherwise replaced gasoline). Total gasoline savings for the year (which include the propane conversion, the switch to gasohol and a mileage reduction of 8%) is estimated at 196,000 gal of gasoline, or 32 percent less than FY 1979 consumption. The rate of fuel cost savings indicate that the payback of the conversion cost for all 170 vehicles ($165,896) will be made in approximately 2 to 5 years. DOE

N81-23978# Systems Control, Inc., Palo Alto, Calif.

INTRODUCTION OF ELECTRIC VEHICLES INTO THE UTILITY SYSTEM: ANALYSIS OF RESEARCH NEEDS Final Report

J. G. Bohn and J. Peschon Feb. 1981 62 p refs
(EPRI Proj. 1524-2)
(EPRI-EM-1716) Avail: NTIS HC A04/MF A01

Electric vehicle penetration prediction models estimate that more than 13 million EVs could be in operation by the year 2000. Depending upon the timing of introduction, location and distributing of these vehicles, a utility's energy and power system could be significantly affected by this new load. Research will be required in EV load characterization and prediction, battery and battery charger technology assessment, generation transmission and distribution systems analysis, load management strategy, financial and regulatory agency perspective and utility/EV interface characterization. These projects will be accomplished through the direct involvement of those utilities that are actively interested in EV technology assessment and demonstration. DOE

N81-23979# Department of Energy, Washington, D. C. Office of Transportation Programs.

ELECTRIC AND HYBRID VEHICLE PROGRAM Quarterly Report, Oct. - Dec. 1980

Feb. 1981 29 p refs
(DOE/CS-0026/13) Avail: NTIS HC A03/MF A01

The development and commercialization of electric vehicles and hybrid electric vehicles is briefly summarized. More extensive information is provided on: the status of hybrid vehicle development contracts; the results of a heuristic model that ranks cities according to their potential for generating EV markets; testing of the Eagle-Picher nickel-iron battery; the test results, advantages, and costs of electronic commutation of permanent magnet motors; the annual market demonstration site operators meeting; and the certification and testing status of demonstration project vehicles. DOE

N81-23980# California Univ., Livermore. Lawrence Livermore Lab.

COMPARISON OF FUTURE BATTERY SYSTEMS FOR APPLICATION TO GENERAL-PURPOSE ELECTRIC VEHICLES

L. G. OConnell Aug. 1980 14 p refs
(Contract W-7405-eng-48)
(UCRL-53092) Avail: NTIS HC A02/MF A01

The results are presented of a study to compare the aluminium/air battery as a general purpose automobile power source with those secondary batteries evaluated in a four year study entitled Energy Storage Systems for Automobile Propulsion. The aluminum/air battery had not developed early enough to be included in the evaluation. Recent progress on this battery makes it important to compare it on a vehicle system basis to other possible future batteries. The analysis techniques used in the comparison were the same as for the four year study. DOE

N81-23981# California Univ., Livermore. Lawrence Livermore Lab.

ADVANCED ELECTRIC VEHICLE

L. G. OConnell Jul. 1980 20 p refs
(Contract W-7405-eng-48)
(UCRL-53089) Avail: NTIS HC A02/MF A01

The Advanced Electric Vehicle is defined as an automobile which can fulfill the general purpose role of today's internal combustion engine powered car without utilizing petroleum fuels directly. It relies principally on the utilization of electricity. A number of candidate systems are described. The present status of each is discussed as are the problems to be overcome before implementation can proceed. DOE

N81-23982# Abcor, Inc., Wilmington, Mass. Walden Div.

EVALUATION OF HOT ACID TREATMENT FOR MUNICIPAL SLUDGE CONDITIONING Final Report

Kenneth J. McNulty, Ann T. Malarkey, Robert L. Goldsmith, and Henry A. Fremont (Champion International Corp.) Aug. 1980 178 p refs
(Contract EPA-68-03-2459)
(PB81-144446; EPA-600/2-80-096) Avail: NTIS HC A09/MF A01 CSCL 13B

Bench scale tests were conducted to evaluate the technical and economic feasibility of the hot acid process for stabilization/conditioning of municipal sewage sludge. This process involves acidification of the sludge (pH 1.5-3) and heating to temperatures below boiling (approximately equal to C). The process improves the dewaterability of the sludge, destroys essentially all pathogens, and preferentially solubilizes certain heavy metals relative to nitrogen and organics. The process demonstrated the potential for good solubilization and removal of toxic heavy metals including cadmium, zinc, and nickel with minimal solubilization of nitrogen. GRA

N81-23983# Hawaii Univ., Honolulu. Water Resources Research Center.

RECYCLING OF SEWAGE EFFLUENT BY SUGARCANE IRRIGATION: A DILUTION STUDY, OCTOBER 1976 TO OCTOBER 1978, PHASE 2-A

Paul C. Ekern, Philip C. S. Loh, Reginald H. F. Young, Gordon L. Dugan, L. Stephen Lau, Roger S. Fujioka, and Karl T. S. How Mar. 1980 118 p refs
(Contract DI-14-31-0001-3811)
(PB81-144669; TR-130; W81-00981) Avail: NTIS HC A06/MF A01 CSCL 13B

Hawaiian sugarcane variety 59-3775 was plated to a random block design of treatments with 6 replicates in central Oahu near the Mililani Sewage Treatment Plant.t. The 5 irrigation treatments for the two cane cycle were: (1) ditch water; (2) 12.5 percent; (3) 25 percent; (4) 50 percent effluent diluted with ditch water; and (5) effluent the first year and ditch water the second. GRA

N81-23154# Eurospace, Paris (France).

STUDIES AND EXPERIMENTS BY EUROSPACE IN THE FIELD OF EDUCATION AND PUBLIC SERVICE [ETUDES ET EXPERIMENTATIONS D'EUROSPACE DANS LE DOMAINE DE L'EDUCATION ET DU SERVICE PUBLIC]

M. Y. Demerliac *In* CNES Symphonie Symp. 1980 p 759-768 In FRENCH; ENGLISH summary (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

N81-23158# United Nations, New York, N. Y.

SYMPHONIE EXPERIMENTS AND FUTURE APPLICATIONS OF TELECOMMUNICATIONS SATELLITES FOR THE UNITED NATIONS NETWORK

Yoshio Tagaya *In* CNES Symphonie Symp. 1980 p 791-803 (For primary document see N81-23101 14-12)
Avail: NTIS HC A99/MF A01

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N81-23984*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF AN ATLAS OF ULTRAVIOLET STELLAR SPECTRA AND A SECOND ATLAS OF ULTRAVIOLET STELLAR SPECTRA FROM OAO 2 OBSERVATIONS
Wayne H. Warren, Jr. and William T. Sheridan Dec. 1980 15 p refs
(NASA-TM-82284; NSSDC/WDC-A-R/S-80-12) Avail: NTIS HC A02/MF A01 CSCL 03A

The magnetic tape version of the Orbiting Astronomical Observatory 2 atlases of ultraviolet stellar spectra is described. The first file of the tape contains ultraviolet stellar fluxes for 164 bright stars in lambda the spectral region 1200 to 1300 A with resolutions of 22 A in the region from 3600 to 1850 A and 12 A in the region from 1850 to 1160 A. Files two and three contain spectra for 132 stars in the region lamba 1200 to 1850 A and 34 stars in the lambda region 1800 to 3600 A, respectively, with resolutions as stated above. The monochromatic flux is given in units of ergs cm(-2)s(-1) (-1) for all data. M.G.

N81-23985*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE UNIVERSITY OF MICHIGAN CATALOGUE OF TWO-DIMENSIONAL SPECTRAL TYPES FOR THE HD STARS. VOLUME 2: DECLINATIONS MINUS 53 DEG TO MINUS 40 DEG
Wayne H. Warren, Jr. Apr. 1981 19 p refs
(NASA-TM-82285; NSSDC/WDC-A-R/S-81-03-Vol-2) Avail: NTIS HC A02/MF A01 CSCL 03A

The magnetic tape version of Volume 2 of the University of Michigan systematic reclassification program for the Henry Draper Catalogue (HD) stars is described. Volume 2 contains all HD stars in the declination range -53 degrees to 40 degrees and also exists in printed form. S.F.

N81-23998*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Operation Sect.
RADIO ASTRONOMY
R. D. Shaffer, P. R. Wolken, and A. E. Niell *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 1-2 (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N81-23986*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GRAND UNIFICATION AND POSSIBLE MATTER-ANTIMATTER DOMAIN STRUCTURE IN THE UNIVERSE
F. W. Stecker Jan. 1981 43 p refs Presented at 10th Texas Symp. on Relativistic Astrophys. Submitted for publication
(NASA-TM-82083) Avail: NTIS HC A03/MF A01 CSCL 03B

The theory and basic concepts for the development of a matter-antimatter domain cosmology are outlined within the framework of the grand unified gauge theory paradigm. It is shown how spontaneous CP symmetry breaking leads to such a domain sturcture in the universe. Astrophysical data such as the cosmic gamma-ray background spectrum, cosmic-ray p flux measurements, and galaxy clustering are found to favor this point of view. Future tests of this form of big-bang cosmology are suggested and discussed, including tests using deep underwater cosmic ray neutrino detectors. J.M.S.

N81-23987*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SUPERROTATION PLANETARY ATMOSPHERES: MECHANICAL ANALOGY, ANGULAR MOMENTUM BUDGET AND SIMULATION OF THE SPIN UP PROCESS
H. G. Mayr, I. Harris, and B. J. Conrath Mar. 1981 46 p refs Presented at the 12th Ann. Meeting of the Div. of Planetary Sci. of the Am. Astron. Soc., Tucson, Ariz., Oct. 1980
(NASA-TM-82137) Avail: NTIS HC A03/MF A01 CSCL 03C

Superrotation rates observed in planetary atmospheres are analyzed based on the concept of a thermally driven zonally symmetric circulation. Specifically, how this superrotation is produced and maintained against the tendency for friction to oppose differential motions between the atmosphere and the underlying planet is addressed. The time evolution of a fluid leading from corotation under uniform heating to superrotation under globally nonuniform heating is simulated using a three dimensional zonally symmetric spectral model and Laplace transformation. The increased tendency toward geostrophy combined with the increase of surface pressure toward the poles (due to meridional mass transport), induces the atmosphere to subrotate temporarily at lower altitudes. The resulting viscous shear near the surface thus permits angular momentum to flow from the planet into the atmosphere where it propagates upwards and, combined with the change in moment of inertia, produces large superrotation rates at higher viscosities. J.M.S.

N81-23988# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
ASTRONOMICAL PROGRAMS: A CANON OF SOLAR ECLIPSES FOR THE YEARS -1500 TO -1000
R. R. Newton Nov. 1980 97 p refs
(PB81-133555; JHU/APL-CP-081) Avail: NTIS HC A05/MF A01 CSCL 03C

This canon of all solar eclipses that occurred between -1500 and -1000 includes the circumstances needed to determine the magnitude of each eclipse at any point on Earth. It is a companion report to the author's 'A Canon of Lunar Eclipses for the Years -1500 to -1000.' GRA

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N81-23989*# Geological Survey, Flagstaff, Ariz.
STATUS AND FUTURE OF EXTRATERRESTRIAL MAPPING PROGRAMS
R. M. Batson Apr. 1981 29 p refs Presented at the 14th Congr. of the Intern. Soc. of Photogrammetry, Hamburg, 1980 Original contains color illustrations
(Contract NASw-13709)
(NASA-CR-3390) Avail: NTIS HC A03/MF A01 CSCL 03B

Extensive mapping programs have been completed for the Earth's Moon and for the planet Mercury. Mars, Venus, and the Galilean satellites of Jupiter (Io, Europa, Ganymede, and Callisto), are currently being mapped. The two Voyager spacecraft are expected to return data from which maps can be made of as many as six of the satellites of Saturn and two or more of the satellites of Uranus. The standard reconnaissance mapping scales

used for the planets are 1:25,000,000 and 1:5,000,000; where resolution of data warrants, maps are compiled at the larger scales of 1:2,000,000, 1:1,000,000 and 1:250,000. Planimetric maps of a particular planet are compiled first. The first spacecraft to visit a planet is not designed to return data from which elevations can be determined. As exploration becomes more intensive, more sophisticated missions return photogrammetric and other data to permit compilation of contour maps. Author

N81-23990*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE POLARITY OF CYCLOSTROPHIC FLOW IN PLANETARY ATMOSPHERES
H. G. Mayr, B. J. Conrath, and I. Harris May 1981 9 p refs Submitted for publication
(NASA-TM-82136) Avail: NTIS HC A02/MF A01 CSCL 03B

Fluids which are completely inviscid in the mathematical sense do not exist. Thus, the concepts of gradient flow and cyclostrophic balance are interpreted as approximate solutions of a boundary value problem for small but finite viscosity. Large scale phenomena such as the superrotation of Venus and cyclones are effectively bounded by the rigidly rotating planetary surface. This polarizes the circulation and excludes so-called anomalous motions from the flow regime. With scale phenomena such as dust devils, both directions are observed which is attributed to the stochastic nature of wind systems surrounding the disturbance. Author

N81-23991*# Illinois Univ., Urbana. Dept. of Chemistry.
STUDIES OF THE ROLE OF METASTABLES AND DOUBLY IONIZED SPECIES IN THE CHEMICAL AND THERMAL STRUCTURE OF THE VENUSIAN AND MARTIAN IONOSPHERES Progress Report
Jane L. Fox 29 May 1981 7 p refs
(Grant NAG2-94)
(NASA-CR-164329) Avail: NTIS HC A02/MF A01 CSCL 03B

Models of the upper atmospheres of Mars and Venus were constructed using Viking and Pioneer Venus data. The neutral densities, with the exception of NO, N(4S), N(2D) and N(2P) were taken from the measured values, along with the neutral, ion, and electron temperatures. Using solar fluxes and relevant cross sections, the production rates of ions and neutral fragments by photo and electron impact processes were computed. These production rates were combined with chemical production rates and loss along with one dimensional transport eddy diffusion, molecular and ambi polar diffusion, and thermal diffusion, to determine the densities of ions and odd nitrogen species. Preliminary calculations show that the chemistry of metastables and doubly ionized species is important in the ionospheres of Mars and Venus. Production of N(+) in metastable reactions is particularly important, and it explains the discrepancy between the measurements of earlier models. Production of CO(+) is also affected. Reactions of O(++) and O(+)(2D) with N2 have important consequences for the escape rate of atomic nitrogen from the Martian atmosphere. A.R.H.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N81-23992*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SOLAR TERRESTRIAL PROGRAMS: A FIVE YEAR PLAN
David P. Stern Aug. 1978 99 p refs
(NASA-TM-82351) Avail: NTIS HC A05/MF A01 CSCL 03B

Major projects to be initiated in the 1980-1985 period, designed to study the Sun, the heliosphere, Earth's magnetosphere, and the upper atmosphere involve the use of spacelab as well as free flying spacecraft. Current and recent investigations in these areas are reviewed and the guiding principles followed in planning future missions are examined. The implementation strategy, the planning process, and supporting research and technology are discussed. A.R.H.

N81-23993*# Denver Univ., Colo. Dept. of Physics.
SOLAR EXTINCTION RADIOMETRY Annual Report, 15 May. 1980 - 15 May. 1981
A. Goldman 20 May 1981 36 p refs
(Contract NAG1-56)
(NASA-CR-164290) Avail: NTIS HC A03/MF A01 CSCL 03B

Work on the spectral line parameters of hydroxyl radical band was completed. The UV-visible data obtained during 1977 balloon flights were used for zone quantification. The region between from 3100 A to 3500 A appears to be the best region to use for determining ozone columns with the three wavelength method. Ozone volume mixing ratios determined for the 1977 data were compared with standard middle latitude ozone profiles. Numerous high and low Sun scans were obtained during ascent and from float altitude (1981 balloon flight) at 0.003 A resolution in the 3068 A to 3089 A region. The spectra are being studied for OH identification and quantification. A.R.H.

N81-23994# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 433. PART 2: (COMPREHENSIVE REPORTS) DATA FOR AUGUST 1980, JULY 1980, MARCH 1980, AND MISCELLANEA
Helen E. Coffey, ed. Sep. 1980 39 p
(PB81-145286; SGD-433; NOAA-80110703-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

In addition to an index for 1979-1980, this issue of comprehensive reports provides data for March 1980 on: solar radio emission and solar X-ray radiation. Preliminary listings of grouped solar flare data from July through October 1979 are available on request. GRA

N81-23995# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 433. PART 1: (PROMPT REPORTS) DATA FOR AUGUST 1980, JULY 1980, MARCH 1980 AND LATE DATA
Helen E. Coffey, ed. Sep. 1980 172 p
(PB81-145278; SGD-433; NOAA-80110702-Pt-1) Avail: NTIS HC A08/MF A01 CSCL 03B

In addition to an index for 1979-1980, this prompt report provides data for August 1980 on: alert periods, daily solar indices, solar flares, solar radio emission, solar wind measurements, coronal holes, spacecraft observations, inferred interplanetary magnetic field polarities, mean solar magnetic field and Boulder Geomagnetic Substorm Log. It also provides data for July 1980 on: daily solar activity centers, sudden ionospheric disturbances, spacecraft observations, solar radio emission, cosmic rays, geomagnetic indices and radio propagation indices. Late data includes solar radio emission June 1980, cosmic rays and geomagnetic indices for May and June 1980. GRA

N81-23536# University Coll. of Wales, Aberystwyth. Dept. of Physics.
PREDICTION TECHNIQUES FOR FORTHCOMING SOLAR MAXIMA
G. M. Brown *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
Avail: NTIS HC A17/MF A01

N81-23538*# Pennsylvania State Univ., University Park. Ionosphere Research Lab.
ULTIMATE LIMITS TO ERROR PROBABILITIES FOR IONOSPHERIC MODELS BASED ON SOLAR GEOPHYSICAL INDICES AND HOW THESE COMPARE WITH THE STATE OF THE ART
J. S. Nisbet and C. G. Stehle *In* AGARD The Phys. Basis of the Ionosphere in the Solar-Terrest. System Feb. 1981 7 p refs (For primary document see N81-23507 14-42)
(Grants NSG-5212; NGL-39-009-003)
Avail: NTIS HC A17/MF A01 CSCL 03B

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

No abstracts in this category.

99 GENERAL

N81-23996*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.

[RESEARCH AND TECHNOLOGY DEVELOPMENTS IN AERONAUTICS, ATMOSPHERIC AND OCEANOGRAPHIC MEASUREMENTS, RADAR APPLICATIONS, AND REMOTE SENSING OF INSECTS USING RADAR] Annual Report

J. D. Oberholtzer, ed. Nov. 1980 19 p

(NASA-TM-73289) Avail: NTIS HC A02/MF A01 CSCL 05A

Highlights of the year's activities and accomplishments are reported in the areas of aircraft safety, scientific ballooning, mid-air payload retrieval, and the design of a microwave power reception and conversion system for on use on a high altitude powered platform. The development and application of an agro-environmental system to provide crop management advisory information to Virginia farmers, and the radar tracking of insects are described. Aircraft systems, developed for measuring atmospheric ozone and nitric acid were used to sample emissions from Mount St. Helens. Investigations of the reliability and precision of the U.S. standard meteorological rocketsonde, applications of the microwave altimeter and airborne lidar system in oceanography, and the development of a multibeam altimeter concept are also summarized. A.R.H.

N81-23997*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

TELECOMMUNICATIONS AND DATA ACQUISITION Progress Report, Jan. - Feb. 1981

N. A. Renzetti, ed. 15 Apr. 1981 160 p refs

(Contract NAS7-100)

(NASA-CR-164288; JPL-TDA-PR-42-62) Avail: NTIS HC A08/MF A01 CSCL 22A

Deep Space Network progress in flight project support, tracking and data acquisition research and technology, network engineering, hardware and software implementation, and operations is reported. In addition, developments in Earth based radio technology as applied to geodynamics, astrophysics, and the radio search for extraterrestrial intelligence are reported. For individual titles, see N81-23998 through N81-24018.

N81-23998*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Operation Sect.

RADIO ASTRONOMY c89

R. D. Shaffer, P. R. Wolken, and A. E. Niell *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 1-2 (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 03A

The activities of the DSN in support of Radio and Radar Astronomy Operations during September through December 1980 are described. Emphasis is on a report of an experiment selected for use of the DSN by the radio Astronomy Experiment Selection Panel: that of VLBI observations of the energetic galactic object SS-433. E.D.K.

N81-23999*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communication Systems Research Sect.

A FREQUENCY AND TIMING SUBSYSTEM FOR THE ORION MOBILE UNIT c48

P. A. Clements *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 3-10 refs (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 14B

A mobile surveying instrument in support of the crustal dynamics program measures the length and direction of the distance between sites on the Earth's surface using VLBI techniques operating at microwave frequencies and extragalactic radio sources. The frequency and timing subsystem uses as a frequency standard the hydrogen maser. An important part of the subsystem is a sophisticated automatic system to monitor frequency stability and accumulated clock error. E.D.K.

N81-24000*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Microwave Observational System Sect.

ORION: MICROWAVE WATER VAPOR RADIOMETER SUBSYSTEM DESIGN c35

R. P. McKinney and N. I. Yamane *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 10-14 refs (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 14B

Electrical path delay caused by atmospheric water vapor may be a limiting error source for geodetic measurements made with VLBI. Direct measurement of atmospheric water vapor is necessary to obtain path delay correction required by the ORION project. A dual channel water vapor radiometer is described which operates at frequencies near the 22 GHz water vapor line and is capable of collecting data that permits calculation of path delay within 2 cm accuracy. E.D.K.

N81-24001*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.

POSTER ERROR PROBABILITY IN THE MU-11 SEQUENTIAL RANGING SYSTEM c65

C. W. Coyle *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 15-21 refs (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 12A

An expression is derived for the posterior error probability in the Mu-2 Sequential Ranging System. An algorithm is developed which closely bounds the exact answer and can be implemented in the machine software. A computer simulation is provided to illustrate the improved level of confidence in a ranging acquisition using this figure of merit as compared to that using only the prior probabilities. In a simulation of 20,000 acquisitions with an experimentally determined threshold setting, the algorithm detected 90% of the actual errors and made false indication of errors on 0.2% of the acquisitions. Author

N81-24002*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.

FREQUENCY STANDARD TEST FACILITY DATA ACQUISITION AND PROCESSING SYSTEM c32

L. J. Knapp *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 22-30 (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 20N

The interim frequency standards test facility tests all frequency standards used in the DSN. It is also the central testing facility for testing all ultrastable hydrogen maser frequency standards. This proposed data acquisition/processing system was designed to support the IFSTF by acquiring and processing the large amounts of data generated there. Author

N81-24003*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.

A FOUR-WAY DISTRIBUTION AMPLIFIER FOR REFERENCE SIGNAL DISTRIBUTION c33

Y. V. Lo *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 31-34 refs (For primary document see N81-23997 14-99)

Avail: NTIS HC A08/MF A01 CSCL 09A

A four way distribution amplifier with up to 100 dB isolation and with low phase noise of -140 dBc in a 1 Hz bandwidth 10 Hz from a 100 MHz signal was developed. It is to be used in the stabilized optical fiber distribution system to provide multiple outputs. E.D.K.

N81-24004*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystem Sect.

STATION STABILITY MEASUREMENT c32
E. N. Sosa *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 35-42 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

Methods and instrumentation are being developed to determine the frequency stability of Deep Space Stations. The efforts are presently focused on the verification of the stability of the X-band uplink and other RF and microwave subsystems which contribute to the overall stability of the system. The measurement methodology is presented as well as frequency stability data generated with the development measurement system. The system characteristics are highlighted and the potential areas where improvements could be made are discussed. Author

N81-24005*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
HIGH SPEED FRONT END OF THE MULTIMEGABIT TELEMETRY DEMODULATOR DETECTOR c17
E. R. Wechsler *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 43-49 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 09F

The high speed front end (HSFE) portion of the Multimegabit Telemetry Demodulator-Detector is discussed. The HSFE accepts in-phase and quadrature analog signals from the input signal conditioner. It samples them with analog-to-digital converters at maximum rate of 64 megasamples per second. The samples are processed digitally and the integrals of I, Q, and of their crossproduct over one symbol period are supplied at symbol rate to the rest of the system. E.D.K.

N81-24006*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Telecommunications Systems Sect.
ISPM X-BAND UPLINK TECHNOLOGY DEMONSTRATION. PART 1: OVERVIEW c32
T. A. Komarek, J. G. Meeker, and R. B. Miller *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 50-62 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 17B

The ground and spacecraft hardware research, design, and implementation lead to an end to end in flight technology demonstration on the International Solar Polar Mission spacecraft. An introduction to the overall effort is given and the flight experiment objectives are established. The expected improvements in the telecommunications performance are summarized. Also presented is a conceptual mission operations plant. E.D.K.

N81-24007*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
END-TO-END QUALITY MEASURE FOR TRANSMISSION OF COMPRESSED IMAGERY OVER A NOISY CODED CHANNEL c33
V. N. Korwar and P. J. Lee *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 63-72 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 09C

For the transmission of imagery at high data rates over large distances with limited power and system gain, it is usually necessary to compress the data before transmitting it over a noisy channel that uses channel coding to reduce the effect of noise introduced errors. Both compression and channel noise introduce distortion into the imagery. In order to design a communication link that provides adequate quality of received images, it is necessary first to define some suitable distortion measure that accounts for both these kinds of distortion and then to perform various tradeoffs to arrive at system parameter values that will provide a sufficiently low level of received image distortion. The overall mean square error is used as the distortion measure and a description of how to perform these tradeoffs are included. E.D.K.

N81-24008*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Sect.
CALCULATION OF ATMOSPHERIC LOSS FROM MICROWAVE RADIOMETRIC NOISE TEMPERATURE MEASUREMENTS c46
C. Stelzried and S. Slobin *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 73-80 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 04A

Microwave propagation loss in the atmosphere can be inferred from microwave radiometric noise temperature measurements. The relevant equations are given and a derivation and calculation is made assuming various physical models. Comparison is made with the commonly used lumped element atmospheric model (isothermal and uniform loss) and the model with linear temperature and exponential loss distributions. The results are useful for estimating the integral inversion differences due to the model selection. This indicates that the commonly used lumped element atmospheric model is a very good approximation with judicious choice of the effective physical temperature. For the worst case comparison, the lumped element model agrees with the variable parameter model within 0.2 dB up to a propagation loss of 3 dB. Author

N81-24009*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
MAXIMIZING THROUGHPUT OVER AN AVERAGE-POWER-LIMITED AND BAND-LIMITED OPTICAL PULSE POSITION MODULATION CHANNEL c74
D. Zwillinger *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 81-86 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20F

Given an optical pulse position modulation (PPM) channel, with an average power constraint and a bandwidth constraint, the word length needed to maximize the information throughput achievable by the channel is determined. It is shown that, to achieve the maximal capacity, the channel must be operated with a high erasure probability. This implies that coding schemes capable of compensating for a high percentage of erasures are needed for the PPM channel. E.D.K.

N81-24010*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
OPTIMUM DESIGN OF HYBRID PHASE LOCKED LOOPS c60
P. Lee and T. Yan *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 87-95 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 09B

The design procedure of phase locked loops is described in which the analog loop filter is replaced by a digital computer. Specific design curves are given for the step and ramp input changes in phase. It is shown that the designed digital filter depends explicitly on the product of the sampling time and the noise bandwidth of the phase locked loop. This technique of optimization can be applied to the design of digital analog loops for other applications. E.D.K.

N81-24011*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
THE RELIABILITY OF MULTISTATE, MULTIOUTPUT SYSTEMS c38
E. J. Subelman *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 96-104 ref (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 14D

A system which can generate multiple signals such that each signal can have different quality states is modeled. A measure of the effectiveness of the system as a function of the status of its components is developed. Assuming only that the probability distribution of the status of each component is known, bounds on the probability distribution of the system's measure of effectiveness are developed. Author

N81-24012*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
NEW RESULTS ON ANTENNA ARRAYING, PART 1 c32
L. J. Deutsch, R. L. Miller, and S. A. Butman *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 105-111 ref (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

Baseband combining with and without combined carrier

referencing for antenna arrays are compared under two scenarios for the Voyager 2 Uranus encounter. The combined carrier reference scheme is estimated to outperform the baseband only scheme by less than 0.3 dB E (sub b)/N (sub 0) at a bit error probability of 0.005. These results were attained both with mathematical modeling and software Viterbi decoder simulations. Author

N81-24013*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Engineering Sect.
THE 34-METER ANTENNA-SUBREFLECTOR TRANSLATIONS TO MAXIMIZE RF GAIN c32
M. S. Katow *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 112-120 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

The extension of the 26 meter antenna to 34 meter diameter decreased the F/D ratio. This F/D change resulted in unacceptable gain losses due to the hyperboloid's lateral deflections. A three direction translating mounting device was added to the hyperboloid. This device was controlled by a microprocessor to minimize the offsets of the phase centers in the cassegrain RF system and also compensated for boresight directions. The use of the radiation program to predict the gain losses from displacements computed by a structural computing program using an analytical model of the 34 meter reflector structure is discussed. Field test results showed accurate predictions for the Y and Z hyperboloid translations. In the X direction, the prediction value was low. However, the computed gain losses vs primary foci offsets by the radiation program were verified by field tests. E.D.K.

N81-24014*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Sect.
A DECODING FAILURE TEST FOR THE TRANSFORM DECODER OF REED-SOLOMON CODE c61
R. L. Miller, T. K. Truong, and I. S. Reed (Univ. of Southern California, Pasadena) *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 121-124 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 09B

Using a finite field transform, a transform decoding algorithm is able to correct erasures as well as errors of any (n,k,d) Reed-Solomon code over the finite field GF(q). A pitfall of transform decoding and how to avoid it are discussed. A simple test is given so that the decoder fails to decode instead of introducing additional errors, whenever the received word contains too many errors and erasures. E.D.K.

N81-24015*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. TDA Mission Support Office.
RADIO FREQUENCY INTERFERENCE PROTECTION OF COMMUNICATIONS BETWEEN THE DEEP SPACE NETWORK AND DEEP SPACE FLIGHT PROJECTS c32
D. W. H. Johnston *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 125-131 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 20N

The increasing density of electrical and electronic circuits in Deep Space Station systems for computation, control, and numerous related functions has combined with the extension of system performance requirements calling for higher speed circuitry along with broader bandwidths. This has progressively increased the number of potential sources of radio frequency interference inside the stations. Also, the extension of spectrum usage both in power and frequency as well as the greater density of usage at all frequencies for national and international satellite communications, space research, Earth resource operations and defense, and particularly the huge expansion of airborne electronic warfare and electronic countermeasures operations in the Mojave area have greatly increased the potential number and severity of radio frequency interference incidents. The various facets of this problem and the efforts to eliminate or minimize the impact of interference on Deep Space Network support of deep space flight projects are described. E.D.K.

N81-24016*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Control Center Operations.
DSN SCHEDULING SYSTEM c81
R. Dorham *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 132-141 (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 05A

The Deep Space Network (DSN) Scheduling Group provides the operationally oriented administrative support necessary for the effective scheduling of the DSN. The scheduling system plus the levels of schedules are explained. E.D.K.

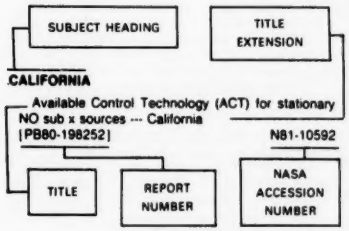
N81-24017*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Engineering Sect.
COMPUTER SIMULATED BUILDING ENERGY CONSUMPTION FOR VERIFICATION OF ENERGY CONSERVATION MEASURES IN NETWORK FACILITIES c44
B. Plankey *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 142-146 refs (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 10B

A computer program called ECPVER (Energy Consumption Program - Verification) was developed to simulate all energy loads for any number of buildings. The program computes simulated daily, monthly, and yearly energy consumption which can be compared with actual meter readings for the same time period. Such comparison can lead to validation of the model under a variety of conditions, which allows it to be used to predict future energy saving due to energy conservation measures. Predicted energy saving can then be compared with actual saving to verify the effectiveness of those energy conservation changes. This verification procedure is planned to be an important advancement in the Deep Space Network Energy Project, which seeks to reduce energy cost and consumption at all DSN Deep Space Stations. E.D.K.

N81-24018*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Deep Space Network Engineering Sect.
REPORTING CAPABILITIES AND MANAGEMENT OF THE DSN ENERGY DATA BASE c82
R. D. Hughes and S. T. Boyd *In its* Telecommun. and Data Acquisition 11 Apr. 1981 p 147-153 ref (For primary document see N81-23997 14-99)
Avail: NTIS HC A08/MF A01 CSCL 05B

The DSN Energy Data Base is a collection of computer files developed and maintained by DSN Engineering. The energy consumption data must be updated monthly and summarized and displayed in printed output as desired. The methods used to handle the data and perform these tasks are described. Author

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7050).

A

A-7 AIRCRAFT
Design, development, and evaluation of lightweight hydraulic system, phase 1 --- A-7 aircraft
[AD-A097505] N81-23075

ABLATION
Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905

ABSORPTANCE
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, summer, 1978
[AD-A097134] N81-23749

Atmospheric optical propagation comparisons during MAGAT-80
[AD-A097274] N81-23752

ABSORPTION COOLING
Performance of active solar space-cooling systems: The 1980 cooling season
[SOLAR/0023-81/40] N81-23647

ABSORPTION CROSS SECTIONS
Quantitative absorption and fluorescence studies of NO between 1060 and 2000 A
[NASA-CR-164340] N81-23867

ABSORPTION SPECTRA
Coherent transient effect studies of Rydberg atoms
[AD-A097588] N81-23207

ABSTRACTS
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583

Management: A continuing bibliography with indexes
[NASA-SP-7500(15)] N81-23936

ACCELERATION (PHYSICS)
Shock spectrum calculation from acceleration time histories
[AD-A097162] N81-23755

ACCELERATION TOLERANCE
Tolerance of the head and neck to -G sub x inertial loading of the head
[AD-A097632] N81-23789

ACCURACY
A time comparison experiment between Shangai and Paris via Symphonie satellite N81-23136

Ionospheric predictions for HF radio systems: The future N81-23537

Modeling misregistration and related effects on multispectral classification
[NASA-CR-164282] N81-23563

The accuracy of a modified Peizer Approximation to the hypergeometric distribution, with comparisons to some other approximations
[AD-A097541] N81-23854

ACETYLENE
Synthesis and properties of highly conducting derivatives of polyacetylene, polyparaphenyleneand graphite N81-23274

ACOUSTIC ATTENUATION
Lateral attenuation of high-by-pass ratio engined aircraft noise
[NASA-TM-81968] N81-23862

ACOUSTIC DELAY LINES
The 403 MHz SAW oscillator
[AD-A097675] N81-23387

ACOUSTIC EXCITATION
Response of a thermal barrier system to acoustic excitation in a gas turbine nuclear reactor
[GA-A-16016] N81-23866

ACOUSTIC MEASUREMENTS
Classification of operating conditions of turbomachines from solid borne sound N81-23015

ACOUSTIC SCATTERING
Termination of surface acoustic wave velocity and impedance differences between metal strips and free surface regions of metallic gratings
[AD-A097337] N81-23386

A study of the effect of terrain on helicopter noise propagation by acoustical modeling
[AD-A097626] N81-23864

ACOUSTICS
On source radiation
[NASA-CR-166176] N81-23343

ACOUSTO-OPTICS
Acoustical holographic recording with coherent optical read-out and image processing
[AD-A097299] N81-23439

The acousto-optic interaction in an infinite slab of isotropic material
[AD-A097202] N81-23892

ACTIVATION ENERGY
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262

Reduced annealing temperatures in silicon solar cells
[NASA-TM-82597] N81-23627

ACTIVE CONTROL
ACOSS six (Active Control Of Space Structures)
[AD-A097206] N81-23183

ADAPTIVE CONTROL
Homing missile guidance studies: Observability, adaptability
[AD-A097624] N81-23178

Environment-adaptive radar techniques
[AD-A097262] N81-23351

Compensatory control of form error in machining N81-23459

Bounded error adaptive control, part 1
[AD-A097628] N81-23824

ADAPTIVE FILTERS
Recursive least squares with linear constraints
[UCRL-85330] N81-23837

ADAPTIVE OPTICS
Advanced wavefront sensor concepts
[AD-A097187] N81-23391

ADDITIVES
Effects of additives on methanation activity of Raney nickel catalysts
[BM-RI-8487] N81-23217

ADHESION
The role of chemical bonding in adhesion
[AD-A097388] N81-23281

The role of chemical bonding in the adhesion of elastomers
[AD-A097223] N81-23282

ADHESIVE BONDING
The effect of cooling rate on the apparent bond strength of porcelain-metal couples
[AD-A097492] N81-23279

The role of chemical bonding in adhesion
[AD-A097388] N81-23281

Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619

ADIABATIC EQUATIONS
Plasmas in particle accelerators: Adiabatic theories for bunched beams
[UCID-18947] N81-23920

ADSORPTION
Chemical diffusion on solid surfaces
[COO-4220-4] N81-23224

ESR studies of surface adsorption and catalysts under ultrahigh vacuum conditions
[DOE/ER-04991/2] N81-23229

AERATION
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586

AERIAL EXPLOSIONS
Structure response and damage produced by airblast form surface mining
[PB81-148918] N81-23593

AERIAL PHOTOGRAPHY
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583

Ionospheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760

AERIAL RECONNAISSANCE
Reconnaissance Sensor System exploitation
[AD-A097224] N81-23567

AERODYNAMIC CHARACTERISTICS
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 1: Study overview --- aerodynamic characteristics
[NASA-CR-152391-VOL-1] N81-23030

Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 2: Evaluation of prediction methodologies [NASA-CR-152391-VOL-2] N81-23031
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 3: Effects of configuration variations from baseline [NASA-CR-152391-VOL-3] N81-23032
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 4: RALS R104 aerodynamic characteristics and comparisons with E205 configuration aerodynamic characteristics [NASA-CR-152391-VOL-4] N81-23033
Investigation of aerodynamic characteristics of wings having vortex flow using different numerical codes [NASA-CR-165706] N81-23034
Two-dimensional aerodynamic characteristics of the NACA 0012 airfoil in the Langley 8 foot transonic pressure tunnel [NASA-TM-81927] N81-23036
Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel [NASA-TM-81285] N81-23039

AERODYNAMIC CONFIGURATIONS
Trailing edge wake flow characteristics of upper surface blown configurations --- noise generators [NASA-CR-152224] N81-23028
Method for predicting the jet-induced aerodynamics of V/STOL configurations in transition [AD-A097356] N81-23043
Digital Avionics Information System (DAIS). Volume 2: Impact of DAIS concept on life cycle cost. Supplement [AD-A097438] N81-23084
Technical evaluation report on the Fluid Dynamic Panel Symposium on Subsonic/Transonic Configuration/Aerodynamics [AGARD-AR-146] N81-23431

AERODYNAMIC DRAG
An investigation of drag reduction for a standard truck with various modifications [NASA-CR-163107] N81-23040

AERODYNAMIC FORCES
Unsteady transonic flow past airfoils in rigid body motion --- predicting aerodynamic forces for flutter analysis [AD-A097142] N81-23041

AERODYNAMIC LOADS
Boundary Layer Effects on Unsteady Airloads [AGARD-CP-296] N81-23044
Some remarks on the unsteady airloads on oscillating control surfaces in subsonic flow N81-23055
Comparison of theoretical predictions of orbiter airloads with wind tunnel and flight test results for a Mach number of 0.52 [NASA-TM-81358] N81-23066
Performance deterioration based on simulated aerodynamic loads test, JT9D jet engine diagnostics program [NASA-CR-165297] N81-23086

AERODYNAMIC STABILITY
Some remarks on boundary layer effects on unsteady airloads N81-23050

AERODYNAMICS
Description of recent changes in the Langley 6- by 28-inch transonic tunnel [NASA-TM-81947] N81-23096

AEROELASTICITY
Boundary Layer Effects on Unsteady Airloads [AGARD-CP-296] N81-23044
An assessment of theoretical models for viscous and transonic flow N81-23046
Viscous effects on unsteady airloads of oscillating configurations N81-23049
Experimental studies of scale effects on oscillating airfoils at transonic speeds N81-23054

AEROSOLS
Airborne measurement of aerosol size distributions over northern Europe. Volume 1: Spring and fall 1976, summer 1977 [AD-A097090] N81-23750
Fluorescent scattering by molecules embedded in small particles [DOE/EV-04361/T2] N81-23869

AEROSPACE TECHNOLOGY TRANSFER
Application of Symphonie experiences in follow-up projects at MBB N81-23163

AEROTHERMOCHEMISTRY
Coal combustion aerothermochemistry research [DOE/ER-10029/T1] N81-23216

AFRICA
A climatological guide for Meteosat users [ESA-SP-1027] N81-23759

AGRICULTURE
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas [E81-10130] N81-23543
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America [E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States [E81-10139] N81-23548

AH-1G HELICOPTER
Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters [AD-A097283] N81-23438
Analytical testing [NASA-CR-3429] N81-23487

AIR CONDITIONING EQUIPMENT
An analysis of thermal balance in the cooled cabin of a Sea King Helicopter [AD-A097199] N81-23077

AIR LAND INTERACTIONS
The effect of surface boundary conditions on the climate generated by a coarse-mesh general circulation model [NASA-CR-164296] N81-23765

AIR MASSES
Air mass considerations in fog optical modeling [AD-A097609] N81-23772

AIR POLLUTION
Catalytic combustion of coal-derived liquid fuels [EPRI-AP-1666] N81-23215
Initial validation of an ambient air quality model for Naval air operations [AD-A097665] N81-23715
Lagrangian measurement platform flights in support of the Tennessee Plume Study: Field effort and data [SAND-79-1336] N81-23717
Diesel-exhaust emissions-toxicology program [LMF-81] N81-23719
Exploratory benefit-cost analysis of environmental controls on hydrothermal energy [PNL-3527] N81-23725
Sensitivity and response time improvements in millimeter-wave spectrometers [LBL-8789] N81-23726
Measurement of asbestos air pollution inside buildings sprayed with asbestos [PB81-147001] N81-23731
Four corners air monitoring [PB81-144156] N81-23733
Symposium on the transfer and utilization of particulate control technology. Volume 3: Particulate control devices [PB81-144800] N81-23734
Economic implications of regulating nonaerosol chlorofluorocarbon emission: An executive briefing [PB81-146698] N81-23735
Flexible urethane foams and chlorofluorocarbon emissions: A support document for economic implications of regulating chlorofluorocarbon emissions from nonaerosol applications [PB81-146706] N81-23736
Report of the NASA working group on tropospheric program planning [NASA-RP-1062] N81-23742

AIR QUALITY
Testing of new technology: Three-way catalyst equipped vehicles in Los Angeles [PB81-138075] N81-23474
Preconcentration methods for the determination of gaseous sulfur compounds in air N81-23710
Initial validation of an ambient air quality model for Naval air operations [AD-A097665] N81-23715
Environmental assessment of the US Department of Energy electric and hybrid vehicle program [ANL/CNSV-13] N81-23722
US Department of Energy environmental compliance program handbook: Federal regulations on air quality, fossile energy [ORNL/EIS-176] N81-23727
NOAA Meteorology Laboratory support to the Environmental Protection Agency [PB81-149072] N81-23732
Four corners air monitoring [PB81-144156] N81-23733
Policy options for the transportation-air-quality process [PB81-150914] N81-23737
Meteorological and air quality data report. WIPP site: Eddy County, New Mexico --- radioactive waste disposal site selection [SAND-81-7052] N81-23779

AIR SAMPLING
Preconcentration methods for the determination of gaseous sulfur compounds in air N81-23710
Measurement of asbestos air pollution inside buildings sprayed with asbestos [PB81-147001] N81-23731

AIR TRAFFIC CONTROL
Summary of transponder data, May 1979 - November 1979 [AD-A097569] N81-23061
Electronic flight rules: An alternative separation assurance concept [AD-A097570] N81-23063

AIR WATER INTERACTIONS
Experimental and theoretical investigation of droplet deposition and heat transfer in air-water dispersed flow N81-23409
The effect of surface boundary conditions on the climate generated by a coarse-mesh general circulation model [NASA-CR-164296] N81-23765
Comparison of the Marine Index of refraction structure parameter, C2n, model with optical measurements [AD-A097691] N81-23776

AIRBORNE EQUIPMENT
Functional testing airborne navigation equipment [AD-A097115] N81-23062
Functional testing airborne radars [AD-A097562] N81-23358

AIRBORNE/SPACEBORNE COMPUTERS
Relationships for a flight performance computer N81-23014
Navaids calibration evaluation with a computer-controlled avionics data acquisition system N81-23020
Demonstration Advanced Avionics System (DAAS) functional description --- Cessna 402B aircraft [NASA-CR-152405] N81-23080

AIRCRAFT COMPARTMENTS
An analysis of thermal balance in the cooled cabin of a Sea King Helicopter [AD-A097199] N81-23077

AIRCRAFT CONFIGURATIONS
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 3: Effects of configuration variations from baseline [NASA-CR-152391-VOL-3] N81-23032

AIRCRAFT DESIGN
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies [NASA-CR-152336-1] N81-23064
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data [NASA-CR-152336-2] N81-23065
Technical evaluation report on the Fluid Dynamic Panel Symposium on Subsonic/Transonic Configuration/Aerodynamics [AGARD-AR-146] N81-23431

AIRCRAFT ENGINES
An analysis of opportunistic maintenance policy for the F100PW100 aircraft engine [AD-A097548] N81-23025
Application of ion implantation for the improvement of localized corrosion resistance of M50 steel bearings [AD-A097230] N81-23466

AIRCRAFT EQUIPMENT
Experiences with a Flight Data Recording System (FDRS) in a German Airforce fighter bomber wing after field trials --- digital equipment N81-23009
Detection and location of faults in onboard aircraft systems with the aid of the Automatic Fault Identification System (AFIS) N81-23022

Development of maintenance METRICS to forecast resource demands of weapon systems (parameter polarization), revision A
[AD-A097692] N81-23325

AIRCRAFT HAZARDS
Commercial aviation icing research requirements
[NASA-CR-165336] N81-23069
Rotorcraft aviation icing research requirements: Research review and recommendations
[NASA-CR-165344] N81-23070

AIRCRAFT HYDRAULIC SYSTEMS
Design, development, and evaluation of lightweight hydraulic system, phase 1 --- A-7 aircraft
[AD-A097505] N81-23075

AIRCRAFT INSTRUMENTS
Contributions to the 9th Symposium on aircraft integrated data systems --- Conferences
[ESA-TT-532] N81-23008

AIRCRAFT LANDING
Application of variable structure system theory to aircraft flight control --- AV-8A and the Augmentor Wing Jet STOL Research Aircraft
[NASA-CR-164321] N81-23093

AIRCRAFT MAINTENANCE
Structural design of BFRP patches for Mirage wing repair
[AD-A097195] N81-23024
An analysis of opportunistic maintenance policy for the F100PW100 aircraft engine
[AD-A097548] N81-23025
F-16 integrated logistics support: Still time to consider economical alternatives
[PB81-137473] N81-23079
Weapons system support resources demand parameters - logistics
[AD-A097517] N81-23937

AIRCRAFT MODELS
Research on near field pattern effects
[AD-A097102] N81-23353

AIRCRAFT NOISE
Cumulative annoyance due to multiple aircraft flyover with differing peak noise levels
[NASA-CR-3417] N81-23712
An airport community noise-impact assessment model
[NASA-TM-80198] N81-23713

AIRCRAFT PERFORMANCE
Relationships for a flight performance computer N81-23014
The use of aircraft integrated data system at KLM --- performance monitoring N81-23019

AIRCRAFT PRODUCTION COSTS
A cost function for military airframes
[AD-A097538] N81-23966
A cost function for an airframe production program
[AD-A097540] N81-23967

AIRCRAFT RELIABILITY
Description of the British Civil Aviation Airworthiness Data Recording Programme (CAADRP) --- analysis of flight recorder data N81-23017

AIRCRAFT SAFETY
Description of the British Civil Aviation Airworthiness Data Recording Programme (CAADRP) --- analysis of flight recorder data N81-23017
Research and technology developments in aeronautics, atmospheric and oceanographic measurements, radar applications, and remote sensing of insects using radar
[NASA-TM-73289] N81-23996

AIRCRAFT STRUCTURES
A comparison of laboratory measured temperatures with predictions for a spar/skin type aircraft structure
[NASA-TM-81359] N81-23067
Aircraft wing weight build-up methodology with modification for materials and construction techniques
[NASA-CR-166173] N81-23068
Fatigue life variability in aluminum alloy aircraft structures
[AD-A097198] N81-23249

AIRCRAFT SURVIVABILITY
ATTACK vs SCAN: A comparison of endgame aircraft survivability computer programs
[AD-A097663] N81-23076

AIRCRAFT TIRES
Heat generation in aircraft tires under free rolling conditions
[NASA-CR-164273] N81-23461
Static and dynamic evaluation of A-37 cast and cast carcass/integral tread tires
[AD-A097684] N81-23465

AIRFOIL PROFILES
Viscous effects on unsteady airloads of oscillating configurations N81-23049

AIRFOILS
Two-dimensional aerodynamic characteristics of the NACA 0012 airfoil in the Langley 8 foot transonic pressure tunnel
[NASA-TM-81927] N81-23036
Unsteady transonic flow past airfoils in rigid body motion --- predicting aerodynamic forces for flutter analysis
[AD-A097142] N81-23041
Preliminary results of a study of unsteady airfoil surface pressures and turbulent boundary layers
[AD-A097560] N81-23042
Analysis of turbulent flow about an isolated airfoil using a time dependent Navier-Stokes procedure N81-23053
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056
Mean-flow and turbulence measurements in the vicinity of the trailing edge of an NACA (63 sub 1)-012 airfoil
[NASA-TP-1845] N81-23410

AIRFRAME MATERIALS
Aircraft wing weight build-up methodology with modification for materials and construction techniques
[NASA-CR-166173] N81-23068

AIRFRAMES
Fuel/engine/airframe trade off study
[AD-A097391] N81-23073
Technical evaluation report on the Fluid Dynamic Panel Symposium on Subsonic/Transonic Configuration/Aerodynamics
[AGARD-AR-146] N81-23431
Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters
[AD-A097283] N81-23438
A cost function for military airframes
[AD-A097538] N81-23966
A cost function for an airframe production program
[AD-A097540] N81-23967

AIRPORTS
An airport community noise-impact assessment model
[NASA-TM-80198] N81-23713

AIRSPEED
Groundspeed/airspeed differences as a wind shear indicator and flight evaluation of a DME-derived system to determine groundspeed
[AD-A097566] N81-23768

ALASKA
Oil and natural gas from Alaska, Canada, and Mexico: Only limited help for US
[EMD-80-72] N81-23552
Water resources data for Alaska, water year 1979
[PB81-144818] N81-23580

ALBEDO
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, summer, 1978
[AD-A097134] N81-23749

ALCOHOLS
Ethanol fuel modification for highway vehicle use
[ALO-3683-T1] N81-23306

ALFALFA
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

ALGORITHMS
Relationships for a flight performance computer N81-23014
An algorithm for the rapid location of an extreme of a function subject only to geometric restrictions
[NASA-CR-160940] N81-23812
A general algorithm for the construction of contour plots
[NASA-TM-81287] N81-23813
Second derivative algorithms for minimum delay distributed routing in networks
[AD-A097623] N81-23835
Vectorization of algorithms for solving systems of difference equations
[LA-UR-81-270] N81-23836
Poster error probability in the Mu-11 Sequential Ranging System N81-24001

ALIGNMENT
A time domain simulation of a beam control system
[AD-A097423] N81-23453

ALKALI METALS
Raman scattering by a molecule adsorbed at the surface of a thin metallic film
[IS-T-922] N81-23873

ALKALIES
Thermally stimulated currents in glasses N81-23272

ALKALINE BATTERIES
Inexpensive cross-linked polymeric separators made from water soluble polymers
[NASA-TM-82619] N81-23205

ALKENES
In-place polymerizations of electrophilic olefins
[AD-A097453] N81-23277

ALLOCATIONS
National Aeronautics and Space Administration Authorization Act, 1982
[H-REPT-97-32] N81-23971
National Aeronautics and Space Administration Authorization Act, 1982
[S-REPT-97-100] N81-23973

ALLOYS
Electrochemical corrosion behavior of alloys formed by ion implantation
[PB81-135006] N81-23266
Characterization of alloys formed by ion implantation
[PB81-148223] N81-23270

ALUMINUM
Experimental processing of salt slags from an aluminum dross furnace
[PB81-135022] N81-23264
Glass ceramics for sealing to high-thermal-expansion metals
[SAND-80-2192] N81-23297
Comparison of future battery systems for application to general-purpose electric vehicles
[UCRL-53092] N81-23980

ALUMINUM ALLOYS
Environmental effects on fatigue behavior of metals
[AD-A097546] N81-23248
Fatigue life variability in aluminum alloy aircraft structures
[AD-A097198] N81-23249
Analysis of results from an International Fatigue Test Programme
[AD-A097200] N81-23493
Impacted notch bend specimen --- aluminum alloys
[AD-A097131] N81-23495
Materials for high efficiency monolithic multigap concentrator solar cells
[SERI/TR-8081-1-T3] N81-23646
Alloy development for irradiation performance in fusion reactors
[DOE/ER-10107/1] N81-23914

ALUMINUM CHLORIDES
Partial pressures of gaseous HCl and H2O over aqueous solutions of HCl, AlCl3, and FeCl3
[PB81-147381] N81-23232

ALUMINUM OXIDES
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299
Microstructural effects on the mechanical properties and thermal shock resistance of a high alumina refractory concrete N81-23479

AMMETERS
The role of microcomputers in trace metal analysis N81-23198

AMMONIA
Study of a temperature-stabilized heat pipe system with electrical feedback
[IKE-5-196] N81-23649

AMORPHOUS MATERIALS
On the origins of homogeneous and inhomogeneous linewidths of the (D-5)0-(F-7)0 transition of Eu-3(+) in amorphous solids
[AD-A097614] N81-23212
AMORPHOUS SEMICONDUCTORS
CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684
AMPLIFICATION
Discovery of natural gain amplification in the 10 muon m CO2 laser bands on Mars: The first definite natural laser
[NASA-TM-82048] N81-23448
AMPLIFIERS
Methods and formulas for determining the integral nonlinearity of solid-state amplifiers N81-23379
AMPLITUDE DISTRIBUTION ANALYSIS
Signal fluctuations observed during the Symphonie experiment N81-23133
ANALOG DATA
Degradation of the performance of communication systems in the presence of interference
[AD-A097685] N81-23369
ANALOG TO DIGITAL CONVERTERS
Data collection analysis and test
[AD-A097160] N81-23948
High speed front end of the multimegabit telemetry demodulator detector N81-24005
ANALYSIS OF VARIANCE
Analysis of results from an International Fatigue Test Programme
[AD-A097200] N81-23493
ANATASE
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489
ANCHORS (FASTENERS)
Holding capacity of plate anchors
[AD-A097116] N81-23467
ANEMOMETERS
Evaluation of a tethered kite anemometer
[AD-A097082] N81-23440
ANISOTROPY
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290
ANNEALING
Hardness tests on irradiated pressure vessel steel
[IS-T-942] N81-23259
Demonstration of Pulsed Electron Beam Applications (PEBA) for fabricating small geometry semiconductor devices
[AD-A097547] N81-23382
Reduced annealing temperatures in silicon solar cells
[NASA-TM-82597] N81-23627
ANNIHILATION REACTIONS
Theoretical implications on ISABELLE physics --- proton, neutron, and annihilation reactions
[BNL-28825] N81-23916
ANNUAL VARIATIONS
Ionospheric composition: The seasonal anomaly explained N81-23523
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531
Experimental validation of the ONSOD Omega prediction method N81-23540
Changes of the Sq quiet daily variations of the geomagnetic field as a function of time of year and latitude
[AD-A097159] N81-23744
ANODIC STRIPPING
The role of microcomputers in trace metal analysis N81-23198
ANOMALIES
Ionospheric composition: The seasonal anomaly explained N81-23523
ANTENNA ARRAYS
Interference cancellation in self-cohering arrays N81-23337
Maximum entropy image estimation analysis of image formation with thinned random arrays
[AD-A097357] N81-23349
An investigstion of the effects of mutual coupling on the performance of microstrip radiation
[AD-A097556] N81-23383
Satellite Power Systems (SPS) concept definition study, exhibit F
[NASA-CR-161750] N81-23599
New results on antenna arraying, part 1 N81-24012
ANTENNA DESIGN
Highly mobile Earth stations --- Antenna design and packaging N81-23139
The 34-meter antenna-subreflector translations to maximize RF gain N81-24013
ANTENNA RADIATION PATTERNS
MLS: Airplane system modeling
[NASA-CR-165700] N81-23059
Research on near field pattern effects
[AD-A097102] N81-23353
The 34-meter antenna-subreflector translations to maximize RF gain N81-24013
ANTENNAS
The 34-meter antenna-subreflector translations to maximize RF gain N81-24013
ANTIAIRCRAFT MISSILES
ATTACK vs SCAN: A comparison of endgame aircraft survivability computer programs
[AD-A097663] N81-23076
ANTIFOULING
Drag enhancement of microbial slime films on rotating discs
[AD-A097228] N81-23787
ANTIFRICTION BEARINGS
Laboratory investigation of water-lubricated elastomeric bearings
[AD-A097109] N81-23464
ANTIMATTER
Grand unification and possible matter-antimatter domain structure in the universe
[NASA-TM-82083] N81-23986
ANTIPODES
Antipodally symmetric distributions for orientation statistics
[AD-A097460] N81-23848
ANTIQUITIES
Astronomical programs: A canon of solar eclipses for the years -1500 to -1000
[PB81-133555] N81-23988
ANTIREFLECTION COATINGS
Anti-reflection coatings applied by acid leaching process
[NASA-CR-164322] N81-23612
APERTURES
Maximum entropy image estimation analysis of image formation with thinned random arrays
[AD-A097357] N81-23349
APPALACHIAN MOUNTAINS (NORTH AMERICA)
Analysis of the structural parameters that influence gas production from the Devonian shale, volume 1
[DOE/ET-12138/T1-VOL-1] N81-23318
APPLICATIONS OF MATHEMATICS
An algorithm for the rapid location of an extreme of a function subject only to geometric restrictions
[NASA-CR-160940] N81-23812
APPROACH AND LANDING TESTS (STS)
Comparison of theoretical predictions of orbiter airloads with wind tunnel and flight test results for a Mach number of 0.52
[NASA-TM-81358] N81-23066
APPROPRIATIONS
Authorizing appropriations to the National Aeronautics and Space Administration for fiscal year 1982
[H-REPT-97-32] N81-23972
National Aeronautics and Space Administration Authorization Act, 1982
[S-REPT-97-100] N81-23973
APPROXIMATION
Polynomial approximation techniques for differential equations in electrochemical problems
[AD-A097631] N81-23833
Brownian approximations to first passage probabilities
[AD-A097106] N81-23842
The accuracy of a modified Peizer Approximation to the hypergeometric distribution, with comparisons to some other approximations
[AD-A097541] N81-23854
AQUATIC PLANTS
Aquaculture systems for wastewater treatment: An engineering assessment
[PB81-156689] N81-23738
AQUICULTURE
Aquaculture systems for wastewater treatment: An engineering assessment
[PB81-156689] N81-23738
AQUIFERS
Evaluation of hydrothermal resources of North Dakota, phase 1
[DOE/ID-12030/12] N81-23568
ARCHITECTURE
Building under cold climates and on permafrost. Collection of papers from a US-Soviet Joint Seminar
[AD-A097516] N81-23327
User acceptance of an energy efficient office building, a study of the Norris Cotton Federal Office Building
[PB81-147365] N81-23335
ARIANE: Building data bank N81-23961
ARCHITECTURE (COMPUTERS)
Computer utilization in analytical instrumentation N81-23200
Vectorization of algorithms for solving systems of difference equations
[LA-UR-81-270] N81-23836
ARGON
Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon
[PB81-151995] N81-23587
Study of a temperature-stabilized heat pipe system with electrical feedback
[IKE-5-196] N81-23649
ARIZONA
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549
Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel
[AD-A097529] N81-23767
ARKANSAS
Water resources data for Arkansas, water year 1979
[PB81-144842] N81-23579
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586
AROMATIC COMPOUNDS
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290
ARRAYS
Polyurethane fan-out waveguide arrays and computer simulation to control crosstalk in imaging arrays N81-23340
A feasibility study for a versatile deep sea, multileg, stable, cable array
[AD-A097672] N81-23782
ARROW WINGS
Transonic flutter study of a wind-tunnel model of an arrow-wing supersonic transport --- SCAT-15F model test in the Langley Transonic Dynamics Tunnel
[NASA-TM-81962] N81-23071
ARSENIDES
CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683
CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684
ARTIFICIAL INTELLIGENCE
Research on parallelism in problem-solving systems
[AD-A097608] N81-23805
Procedural semantics as a theory of meaning
[AD-A097630] N81-23815
ASBESTOS
Asbestos analytical programs bulk sample analysis: New York City and Maryland
[PB81-146722] N81-23729
Measurement of asbestos air pollution inside buildings sprayed with asbestos
[PB81-147001] N81-23731
ASHES
Particulate processes in pulverized coal flames
[DOE/PC-30300/T2] N81-23218
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299

Construction procedures using self hardening fly ash
[PB81-153884] N81-23334
Recovery and separation of products from the high-temperature chlorination of fly ash
[IS-T-947] N81-23723
Chlorination of fly ash and bentonite with a gas mixture of silicon tetrachloride and chrlorine
[IS-T-920] N81-23724

ASSESSMENTS
An airport community noise-impact assessment model
[NASA-TM-80198] N81-23713

ASTRONOMICAL MAPS
Documentation for the machine-readable version of an atlas of ultraviolet stellar spectra and a second atlas of ultraviolet stellar spectra from OAO 2 observations
[NASA-TM-82284] N81-23984

ASTRONOMICAL TELESCOPES
High resolution imaging of space objects --- observing binary stars from Earth
[AD-A097359] N81-23894

ASTRONOMY
Astronomical programs: A canon of solar eclipses for the years -1500 to -1000
[PB81-133555] N81-23988

ASYMPTOTIC METHODS
An asymptotic unsteady lifting-line theory with energetics and optimum motion of thrust-producing lifting surfaces
[NASA-CR-165679] N81-23035
A hybrid method which combines a moment method current with an asymptotic current N81-23377

ASYMPTOTIC SERIES
On certain integrals which pertain to the forced vibration of plates
[NASA-CR-166175] N81-23488
Asymptotic power of EDF statistics for exponentiality against Weibull and Gamma alternatives
[AD-A097107] N81-23841
Brownian approximations to first passage probabilities
[AD-A097106] N81-23842

ATLANTIC OCEAN
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759

ATMOSPHERIC ATTENUATION
The CTS 11.7 GHz angle of arrival experiment
[NASA-CR-164338] N81-23740
Atmospheric transmittance/radiance computer code FASCOD2
[AD-A097593] N81-23893

ATMOSPHERIC BOUNDARY LAYER
The effect of surface boundary conditions on the climate generated by a coarse-mesh general circulation model
[NASA-CR-164296] N81-23765

ATMOSPHERIC CHEMISTRY
Ionospheric composition: The seasonal anomaly explained N81-23523
Thermospheric neutral composition changes and their causes N81-23524

ATMOSPHERIC CIRCULATION
Neutral winds in the polar ionosphere N81-23519
The effect of surface boundary conditions on the climate generated by a coarse-mesh general circulation model
[NASA-CR-164296] N81-23765
Feasibility study of satellite-borne lidar global wind monitoring system, part 2
[PB81-145369] N81-23781
Superrotation planetary atmospheres: Mechanical analogy, angular momentum budget and simulation of the spin up process
[NASA-TM-82137] N81-23987
On the polarity of cyclostrophic flow in planetary atmospheres
[NASA-TM-82136] N81-23990

ATMOSPHERIC COMPOSITION
Thermospheric neutral composition changes and their causes N81-23524
Assessing the representativeness of ozone monitoring data
[PB81-146995] N81-23730
Solar extinction radiometry
[NASA-CR-164290] N81-23993

ATMOSPHERIC EFFECTS
Magnetospheric and ionospheric flow and the interplanetary magnetic field --- atmospheric effects N81-23510
Magnetospheric influences on the ionosphere N81-23511
Ionospheric disturbances of magnetospheric origin N81-23512

ATMOSPHERIC ELECTRICITY
Electrical coupling between the lower atmosphere and the ionosphere N81-23520

ATMOSPHERIC ENERGY SOURCES
Energetic 0-positive precipitation: A significant energy N81-23527

ATMOSPHERIC HEATING
Energetics of a sudden stratospheric warming simulated with a three-dimensional, spectral, quasi-geostrophic model
[NASA-TP-1847] N81-23761
Superrotation planetary atmospheres: Mechanical analogy, angular momentum budget and simulation of the spin up process
[NASA-TM-82137] N81-23987

ATMOSPHERIC MODELS
Modelling the high-latitude ionosphere N81-23514
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531
Ultimate limits to error probabilities for ionospheric models based on solar geophysical indices and how these compare with the state of the art N81-23538
Some considerations upon models for ionospheric radio communications forecasting N81-23541
Energetics of a sudden stratospheric warming simulated with a three-dimensional, spectral, quasi-geostrophic model
[NASA-TP-1847] N81-23761
Studies of the role of metastables and doubly ionized species in the chemical and thermal structure of the Venusian and Martian ionospheres
[NASA-CR-164329] N81-23991

ATMOSPHERIC OPTICS
Atmospheric optical propagation comparisons during MAGAT-80
[AD-A097274] N81-23752

ATMOSPHERIC PHYSICS
Currents in the auroral zone ionosphere N81-23518
Neutral winds in the polar ionosphere N81-23519
Electrical coupling between the lower atmosphere and the ionosphere N81-23520
First results from the Tromsoe ionospheric modification facility N81-23521
A summary of rocket-induced ionospheric perturbations N81-23522
Relations between solar flux and E-region parameters N81-23525
Energetic particle precipitation at middle and low latitudes N81-23526
On the morphology of the polar thermosphere N81-23528
Structure of electron temperature --- satellite measurements of the ionospheric electron temperature and density N81-23529
Energetics of a sudden stratospheric warming simulated with a three-dimensional, spectral, quasi-geostrophic model
[NASA-TP-1847] N81-23761

ATMOSPHERIC RADIATION
Earth limb radiance transformation
[AD-A097523] N81-23753

ATMOSPHERIC REFRACTION
Atmospheric microwave refractivity and refraction
[NASA-CR-164339] N81-23739

ATMOSPHERIC SCATTERING
Atmospheric optical communication systems
[AD-A097673] N81-23366
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, summer, 1978
[AD-A097134] N81-23749

ATMOSPHERIC SOUNDING
Research study: STS-1 Orbiter Descent
[NASA-CR-161754] N81-23763
RAWINPROC: Computer program for decommutating, interpreting, and interpolating Rawinsonde meteorological balloon sounding data
[NASA-CR-164315] N81-23766

ATMOSPHERIC TEMPERATURE
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759
Energetics of a sudden stratospheric warming simulated with a three-dimensional, spectral, quasi-geostrophic model
[NASA-TP-1847] N81-23761

ATMOSPHERIC TURBULENCE
Mesoscale variability of the atmospheric wind field below 5 km
[AD-A097414] N81-23773
Comparison of the Marine Index of refraction structure parameter, C2n, model with optical measurements
[AD-A097691] N81-23776

ATOMIC CLOCKS
Clock synchronization experiment via Symphonie satellite N81-23135

ATOMIC COLLISIONS
Extended rate equations
[UCID-18932] N81-23879

ATOMIC SPECTRA
Multielement analysis studies by flame and inductively coupled plasma spectroscopy utilizing computer-controlled instrumentation
[PB81-149528] N81-23231
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871

ATOMIC STRUCTURE
Study of local atomic and electronic structure in glassy metallic alloys
[DOE/ER-10382/2] N81-23296

ATTACK AIRCRAFT
Digital Avionics Information System (DAIS). Volume 1: Impact of DAIS concept on life cycle cost
[AD-A097339] N81-23083
Digital Avionics Information System (DAIS). Volume 2: Impact of DAIS concept on life cycle cost. Supplement
[AD-A097438] N81-23084

ATTENTION
Applications of event-related brain potentials in human engineering
[AD-A097542] N81-23795

ATTENUATION COEFFICIENTS
Studies of the photoelectrochemistry of organic dyes using attenuated total reflection techniques
[DOE/ER-10632/1] N81-23213

ATTITUDE INDICATORS
The attitude sensors on Symphonie and their subsequent development N81-23165

AURORAL ELECTROJETS
Currents in the auroral zone ionosphere N81-23518
On the structures and mapping of auroral electrostatic potentials
[NASA-CR-164336] N81-23741

AURORAL ZONES
Currents in the auroral zone ionosphere N81-23518

AURORAS
Space systems: An auroral imaging spectrophotometer (vacuum ultraviolet and visible)
[PB81-133621] N81-23446
The effects of auroral activity on the midlatitude ionosphere N81-23517
Dynamics of the dayside cusp aurora N81-23533
Ultimate limits to error probabilities for ionospheric models based on solar geophysical indices and how these compare with the state of the art N81-23538
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743

AUTOMATIC CONTROL
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142
Solar heating and cooling system installed at RKL Controls Company, Lumberton, New Jersey
[NASA-CR-161679] N81-23597

AUTOMATIC FLIGHT CONTROL
MLS: Airplane system modeling
[NASA-CR-165700] N81-23059

Application of variable structure system theory to aircraft flight control --- AV-8A and the Augmentor Wing Jet STOL Research Aircraft
[NASA-CR-164321] N81-23093

AUTOMATION
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621

AUTOMOBILE ENGINES
Potential impacts of Brayton and Stirling cycle engines
[NASA-CR-164278] N81-23603

AUTOMOBILE FUELS
Propane conversion in the vehicle fleet at the Idaho National Engineering Laboratory
[EGG-TRANS-5291] N81-23977

AUTOMOBILES
Ethanol fuel modification for highway vehicle use
[ALO-3683-T1] N81-23306
Testing of new technology: Three-way catalyst equipped vehicles in Los Angeles
[PB81-138075] N81-23474
Preliminary assessment of the impact of flywheel energy storage technology on taxicab fleet operation in a large metropolitan city
[LA-8722-MS] N81-23685

AUTOREGRESSIVE PROCESSES
A Monte Carlo study of AR(1) estimators under several performance criteria
[AD-A097533] N81-23853

AVAILABILITY
Coal gasification availability analysis
[PB81-153272] N81-23321
Learning to look ahead: The need for a national materials policy and planning process
[EMD-79-30] N81-23974

AVALANCHE DIODES
Controlled avalanche transit-time triode amplifiers
[AD-A097439] N81-23390

AVIONICS
Navaids calibration evaluation with a computer-controlled avionics data acquisition system N81-23020
Demonstration Advanced Avionics System (DAAS) functional description --- Cessna 402B aircraft
[NASA-CR-152405] N81-23080
General Aviation Activity and Avionics Survey
[AD-A097604] N81-23081
NAVAIR Avionics Master Plan
[AD-A097522] N81-23082
Groundspeed/airspeed differences as a wind shear indicator and flight evaluation of a DME-derived system to determine groundspeed
[AD-A097566] N81-23768
A preliminary study of head-up display assessment techniques. 2: HUD symbology and panel information search time
[NASA-TM-78536] N81-23799
A study of avionics time division multiplex bus simulation
[AD-A097375] N81-23810

AXIAL FLOW
Measurement and analysis of the periodic variation of total pressure in an axial-flow compressor stage
[AD-A097296] N81-23090

AXIAL FLOW TURBINES
Measurement and analysis of the periodic variation of total pressure in an axial-flow compressor stage
[AD-A097296] N81-23090

AXIOMS
Terms and axioms for a theory of human-machine systems N81-23796

B

B-58 AIRCRAFT
Silver recovery from aircraft scrap
[PB81-150021] N81-23269

BACKGROUND NOISE
Signal processing in an uncertain environment: Multivariate techniques of nonparametric and robust detection N81-23336

BANDWIDTH
Maximizing throughput over an average-power-limited and band-limited optical pulse position modulation channel N81-24009

BARIUM ION CLOUDS
DNA/PLACES, barium event JAN: Quick-look field report of 'in situ' probe measurements
[AD-A097227] N81-23751

BARLEY
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

BARREN LAND
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542

BARRIERS
An efficient code for the simulation of nonhydrostatic stratified flow over obstacles
[NASA-CR-3385] N81-23762

BASALT
Oregon-based activities in support of the Basalt Waste Isolation Project
[RHO-BWI-SA-42] N81-23880

BASE PRESSURE
An analytical procedure and automated computer code used to design model nozzles which meet MSFC base pressure similarity parameter criteria --- space shuttle
[NASA-CR-161757] N81-23187

BATTERY CHARGERS
Introduction of electric vehicles into the utility system: Analysis of research needs
[EPRI-EM-1716] N81-23978

BAYES THEOREM
Empirical Bayes rules for selecting good populations
[AD-A097619] N81-23843

BAYS (TOPOGRAPHIC FEATURES)
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

BEACONS
Interference cancellation in self-cohering arrays N81-23337

BEAM CURRENTS
A hybrid method which combines a moment method current with an asymptotic current N81-23377

BEAM INJECTION
Ion extraction and optics in three dimensions
[ORNL/TM-7691] N81-23899
ONETWO: A computer code for modeling plasma transport in Tokamaks
[GA-A-16178] N81-23901

BEAUFORT SEA (NORTH AMERICA)
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565

BEDS (PROCESS ENGINEERING)
Experimental studies of partially defluidized bed with immersed heat exchange tubes N81-23407
Hot-gas desulfurization. 1: Use of gasifier ash in a fixed-bed process
[DOE/ET-10463/T1-VOL-1] N81-23716

BENDING
Impacted notch bend specimen --- aluminum alloys
[AD-A097131] N81-23495

BENEFICIATION
A continuous dielectric separator for mineral beneficiation
[PB81-135014] N81-23581

BENTONITE
Chlorination of fly ash and bentonite with a gas mixture of silicon tetrachloride and chrlorine
[IS-T-920] N81-23724

BERING SEA
Physical environment of the Eastern Bering Sea, March 1979
[PB81-148496] N81-23786

BESSEL FUNCTIONS
A numerical treatment of the dynamic motion of a zero bending rigidity cylinder in a viscous stream
[AD-A097450] N81-23426
On certain integrals which pertain to the forced vibration of plates
[NASA-CR-166175] N81-23488

BETA FACTOR
Limiting beta of stellarators with no net current
[PPPL-1738] N81-23913

BIBLIOGRAPHIES
Vibration of curved beams N81-23484
Response of nonlinear mechanical systems to random excitation. Part 1: Markov methods N81-23485
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583
Management: A continuing bibliography with indexes
[NASA-SP-7500(15)] N81-23936

BIG BANG COSMOLOGY
Grand unification and possible matter-antimatter domain structure in the universe
[NASA-TM-82083] N81-23986

BINARY ALLOYS
The relationship between deformation and fracture in two phase elasto-plastic equiaxed alloys N81-23241

BINARY DIGITS
Binary integer linear programming: A hybrid implicit enumeration approach
[AD-A097108] N81-23817

BINARY STARS
High resolution imaging of space objects --- observing binary stars from Earth
[AD-A097359] N81-23894
Documentation for the machine-readable version of the University of Michigan Catalogue of two-dimensional spectral types for the HD stars. Volume 2: Declinations minus 53 deg to minus 40 deg
[NASA-TM-82285] N81-23985

BINARY SYSTEMS (MATERIALS)
Microscopic approach to transport in two-phase random media N81-23408

BIOASSAY
Bioassay of polycyclic aromatic hydrocarbons
[DOE/EV-04477/T2] N81-23677
Environmental quality research fish and aufwuchs bioassay
[AD-A097080] N81-23714

BIOCHEMISTRY
Factors influencing the redox reactions of iron porphyrins N81-23197
Kinetic studies of heterogeneous biocatalysis using the rotating ring-disk enzyme electrode N81-23199

BIODEGRADABILITY
Microbial deterioration of marine diesel fuel from oil shale
[AD-A097674] N81-23304

BIOELECTRICITY
Bioelectrocatalysis using chemically modified electrodes N81-23204

BIOGEOCHEMISTRY
Report of the NASA working group on tropospheric program planning
[NASA-RP-1062] N81-23742

BIOLOGICAL EFFECTS
Comparing energy technology alternatives from an environmental perspective
[DOE/EV-0109] N81-23688

BIOMASS
Advanced system demonstration for utilization of biomass as an energy source
[DOE/ET-20055/T5] N81-23679

BIOMASS ENERGY PRODUCTION
Illinois biomass resources. Annual crops and residues; canning and food-processing wastes, preliminary assessment
[ANL/EMR-6] N81-23573
Advanced system demonstration for utilization of biomass as an energy source, executive summary
[DOE/ET-20055/T3-EXEC-SUMM] N81-23596
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
Advanced system demonstration for utilization of biomass as an energy source. Site study report --- site selection in Maine
[DOE/ET-20055/T1] N81-23662

Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-1] N81-23665
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3, book 2: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-2] N81-23666
Advanced system demonstration for utilization of biomass as an energy source. Volume 4: Design drawings
[DOE/ET-20055/T2-VOL-4] N81-23667
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668
Advanced system demonstration for utilization of biomass as an energy source
[DOE/ET-20055/T5] N81-23679
Biomass energy systems information user study
[SERI/TR-751-748] N81-23690

BIREFRINGENCE
Intramolecular flexibility of relatively rigid polymers, and intermolecular interactions in ordered polymer systems, part 2
[AD-A097424] N81-23284

BISPHENOLS
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290

BLANKETS (FUSION REACTORS)
D-D Tokamak reactor studies
[ANL/FPP/TM-138] N81-23907

BLASTS
Structure response and damage produced by airblast form surface mining
[PB81-148918] N81-23593

BLUE GREEN ALGAE
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553

BOEING 707 AIRCRAFT
Cumulative annoyance due to multiple aircraft flyover with differing peak noise levels
[NASA-CR-3417] N81-23712

BOEING 747 AIRCRAFT
Lateral attenuation of high-by-pass ratio engined aircraft noise
[NASA-TM-81968] N81-23862

BOLTZMANN-VLASOV EQUATION
The Hamiltonian structure of the Maxwell-Vlasov Equations
[AD-A097412] N81-23834

BOREHOLES
In-situ measurement of soil properties
[PB81-130064] N81-23328
Flameproof television camera set for the observation of coal seams and rock strata as well as of tectonic surfaces in underground boreholes
[BMFT-FB-T-80-149] N81-23370
Geothermal energy geopressure subprogram
[DOE/EA-0134] N81-23721

BORIDES
Materials for high-temperature hydrogen fluorine environments
[AD-A097426] N81-23190

BORON REINFORCED MATERIALS
Structural design of BFRP patches for Mirage wing repair
[AD-A097195] N81-23024

BOUNDARY LAYER CONTROL
Introductory remarks on boundary layer effects on unsteady airloads N81-23045
Some remarks on boundary layer effects on unsteady airloads N81-23050

BOUNDARY LAYER FLOW
Preliminary results of a study of unsteady airfoil surface pressures and turbulent boundary layers
[AD-A097560] N81-23042
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters
[ISSN-0077-5606] N81-23412
Compressible turbulent boundary layer interaction experiments
[NASA-CR-164292] N81-23415

BOUNDARY LAYER SEPARATION
Viscous effects on unsteady airloads of oscillating configurations N81-23049
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056
Experiments on a turbulent unsteady boundary layer with separation N81-23057

BOUNDARY LAYER TRANSITION
Methods for calculating unsteady turbulent boundary layers N81-23048
Multiple-scale turbulence modeling of boundary layer flows for scramjet applications
[NASA-CR-3433] N81-23411
Studies of compressible shear flows and turbulent drag reduction
[NASA-CR-165690] N81-23414

BOUNDARY LAYERS
Calculation of two-dimensional inlet flow fields by an implicit method including viscous effects: User's manual
[NASA-CR-3412] N81-23027
Boundary Layer Effects on Unsteady Airloads
[AGARD-CP-296] N81-23044
The boundary layer on compressor cascade blades
[NASA-CR-164330] N81-23416

BOUNDARY LUBRICATION
Lubrication fundamentals
[NASA-TM-81762] N81-23490

BRAIN
Applications of event-related brain potentials in human engineering
[AD-A097542] N81-23795

BRANCHING (MATHEMATICS)
An investigation of several branching functions in a branch and bound algorithm for the chromatic number problem
[AD-A097330] N81-23820

BRAYTON CYCLE
Potential impacts of Brayton and Stirling cycle engines
[NASA-CR-164278] N81-23603

BRAZING
Manufacturing process feasibility study
[UCRL-15319] N81-23251

BRIGHTNESS
An analysis of source structure effects in radio interferometry measurements
[NASA-CR-164285] N81-23344

BRINES
Localized corrosion in materials for geothermal power --- using brines with and without saturated hydrogen sulfide
[DOE/ET-28317/T1] N81-23256
Research and development of a 3 MW power plant from the design, development, and demonstration of a 100 KW power system utilizing the direct contact heat exchanger concept for geothermal brine recovery project
[DOE/ET-28456/T1] N81-23656

BROADCASTING
The French German broadcasting satellite program N81-23170
Symphonie experience and selection of broadcasting standards for direct broadcasting satellite systems N81-23171
Evaluation of the Transcribed Weather Broadcast (TWEB) system and alternatives. Volume 2: Cost analyses of the TWEB radio and telephone accessible mass weather dissemination services
[AD-A097567] N81-23769

BROKEN SYMMETRY
Grand unification and possible matter-antimatter domain structure in the universe
[NASA-TM-82083] N81-23986

BROWNIAN MOVEMENTS
Brownian approximations to first passage probabilities
[AD-A097106] N81-23842

BUFFER STORAGE
Continuous model of an unreliable two-stage material flow system with a finite interstage buffer
[PB81-146862] N81-23859

BURNING RATE
The theory of flammability limits. Conductive-convective wall losses and thermal quenching
[PB81-150047] N81-23233

C

CADMIUM COMPOUNDS
CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683
CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684

CADMIUM SELENIDES
Electrochemical photovoltaic cells CdSe thin film electrodes
[SERI/TR-8002-8-T1] N81-23676

CADMIUM SULFIDES
Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661

CADMIUM TELLURIDES
High efficiency thin film CdTe solar cells
[SERI/PR-9133-1-T1] N81-23641
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652
Low cost sprayed CdTe solar cell research
[SERI/PR-8104-3-T1] N81-23659

CALCULATORS
Use of the TI 59 with applications to probability and statistical analysis
[AD-A097384] N81-23807

CALIBRATING
NASA Metrology and Calibration, 1980
[NASA-CP-2174] N81-23432
An integrated exhaust gas analysis system with self-contained data processing and automatic calibration
[NASA-TM-81592] N81-23435
Examination of distance measuring devices
[PB81-147332] N81-23445
A basis for traceable NDE measurements
[PB81-145757] N81-23478

CALIFORNIA
Wind energy resource atlas. Volume 9: The Southwest region --- Nevada and California
[PNL-3195WERA-9-VOL-9] N81-23634
Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel
[AD-A097529] N81-23767

CALORIMETERS
Monte Carlo simulation of an ac tual segmented calorimeter: A study of calorimeter performance at high energies
[ORNL/TM-7123] N81-23443

CAMERAS
Space systems: An auroral imaging spectrophotometer (vacuum ultraviolet and visible)
[PB81-133621] N81-23448

CANADA
Oil and natural gas from Alaska, Canada, and Mexico: Only limited help for US
[EMD-80-72] N81-23552

CANADIAN SPACE PROGRAMS
Communication satellites in Canada N81-23169

CANCER
Semiconductor detectors for medical tomography with high-energy heavy ions
[LBL-11037] N81-23790

CANOPIES (VEGETATION)
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

CANS
Review of high-level waste form properties
[PNL-3035] N81-23882
CAPACITANCE
Analytical applications of ion cyclotron resonance mass spectroscopy N81-23201
CAPACITORS
High-field effects in metal-aluminum oxide-silicon capacitors N81-23378
CAPS (EXPLOSIVES)
Development of a gasless pyrotechnic cap
[AD-A097197] N81-23301
CARBON DIOXIDE
Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon
[PB81-151995] N81-23587
CARBON DIOXIDE LASERS
Coherent transient effect studies of Rydberg atoms
[AD-A097588] N81-23207
Discovery of natural gain amplification in the 10 muon m CO2 laser bands on Mars: The first definite natural laser
[NASA-TM-82048] N81-23448
CARBON MONOXIDE
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262
CARBON STEELS
Embrittlement of high-strength steels: Effects of impurities and hydrogen N81-23236
CARBONACEOUS MATERIALS
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
CARCINOGENS
Bioassay of polycyclic aromatic hydrocarbons
[DOE/EV-04477/T2] N81-23677
CARRIER DENSITY (SOLID STATE)
High efficiency thin film CdTe solar cells
[SERI/PR-9133-1-T1] N81-23641
CARRIER FREQUENCIES
Carrier frequency stability and its effect on phase shift keying signals in the satellite channel --- Symphonie satellite N81-23123
CARRIER INJECTION
High-field effects in metal-aluminum oxide-silicon capacitors N81-23378
CARRIER MOBILITY
The effect of minority carrier mobility variations on solar cell spectral response
[NASA-TM-82604] N81-23625
CARRIER TRANSPORT (SOLID STATE)
High-field effects in metal-aluminum oxide-silicon capacitors N81-23378
CASCADE FLOW
The boundary layer on compressor cascade blades
[NASA-CR-164330] N81-23416
CAST ALLOYS
Physical and mechanical properties of cast 17-4 PH stainless steel
[SAND-80-2302] N81-23260
CASTING
Thermal analysis of malleable base white iron for quality control N81-23237
Physical and mechanical properties of cast 17-4 PH stainless steel
[SAND-80-2302] N81-23260
Static and dynamic evaluation of A-37 cast and cast carcass/integral tread tires
[AD-A097684] N81-23465
CATALYSIS
ESR studies of surface adsorption and catalysts under ultrahigh vacuum conditions
[DOE/ER-04991/2] N81-23229
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262
CATALYSTS
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227
Surface science and heterogeneous catalysts
[LBL-11690] N81-23230
An investigation of unique metal complexes produced using polystyrene 2,2 prime-bipyridine as a support, and several hydrogenation catalysts derived from this copolymer
[AD-A097174] N81-23285
Testing of new technology: Three-way catalyst equipped vehicles in Los Angeles
[PB81-138075] N81-23474
CATALYTIC ACTIVITY
Radiation/catalytic augmented combustion
[AD-A097442] N81-23208
Catalytic combustion of coal-derived liquid fuels
[EPRI-AP-1666] N81-23215
Effects of additives on methanation activity of Raney nickel catalysts
[BM-RI-8487] N81-23217
Experimental evaluation of catalytic combustion with heat removal at near stoichiometric conditions
[NASA-TM-81748] N81-23609
CATHODES
Experimental investigations of certain side reactions and the initial voltage transient for FeS2 cathodes in thermal batteries
[SAND-80-2341] N81-23399
CATT DEVICES
Controlled avalanche transit-time triode amplifiers
[AD-A097439] N81-23390
CAVITATION CORROSION
International Union of Theoretical and Applied Mechanics: 3rd Symposium on Creep in Structures
[AD-A097420] N81-23494
CAVITIES
S-band microwave system, revision
[AD-A097641] N81-23348
CEILINGS (ARCHITECTURE)
Solar passive ceiling system
[DOE/R5-10148/2] N81-23637
CELLULOSE
Hollow-fiber membranes for photosensitized electron transport
[LBL-12359] N81-23220
CELLULOSE NITRATE
TNT equivalency of bulk nitrocellulose
[AD-A097472] N81-23303
CERAMICS
Development of nondestructive evaluation techniques for high-temperature ceramic heat exchanger components
[ANL-80-123] N81-23292
Effects of internal gas pressure and microstructure on the mechanisms of hot pressing and swelling in ceramics
[COO-2713-5] N81-23293
High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295
Glass ceramics for sealing to high-thermal-expansion metals
[SAND-80-2192] N81-23297
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437
CERENKOV RADIATION
An experimental comparison of pumped superluminal electromagnetic radiation to Cerenkov radiation
[AD-A097571] N81-23361
CERTIFICATION
Rotorcraft aviation icing research requirements: Research review and recommendations
[NASA-CR-165344] N81-23070
CESSNA 402B AIRCRAFT
Demonstration Advanced Avionics System (DAAS) functional description --- Cessna 402B aircraft
[NASA-CR-152405] N81-23080
CHANNEL CAPACITY
Tests and results of integrated TV sound transmission --- Symphonie satellites N81-23129
Maximizing throughput over an average-power-limited and band-limited optical pulse position modulation channel N81-24009
CHANNEL FLOW
Comparison between the SIMPLE and ENERGY mixing models
[DOE/ET-37240/78TR] N81-23703
CHARACTERIZATION
Characterization of alloys formed by ion implantation
[PB81-148223] N81-23270
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Partial characterizations of completely nondeterministic stochastic processes
[AD-A097514] N81-23844
CHARGE COUPLED DEVICES
CCD multi-level logic --- signal processing applications
[AD-A097586] N81-23816
CHARGE EFFICIENCY
Electric and hybrid vehicles charge efficiency tests of ESB EV-106 lead acid batteries
[NASA-CR-164283] N81-23602
CHARGE TRANSFER
In-place polymerizations of electrophilic olefins
[AD-A097453] N81-23277
CHARGE TRANSFER DEVICES
Analysis of an nn+ low-high junction and the application to integrated injection logic devices N81-23375
CHARGED PARTICLES
Sausage mode of a pinched charged particle beam
[UCID-18940] N81-23885
Particle simulation code for longitudinal dynamics of heavy ion beams
[LBL-12205] N81-23910
CHARM (PARTICLE PHYSICS)
Virtual photoproduction of hidden and open charm
[LBL-11844] N81-23870
CHARPY IMPACT TEST
Physical and mechanical properties of cast 17-4 PH stainless steel
[SAND-80-2302] N81-23260
The strontium heat source development program
[PNL-1845-48] N81-23503
CHARRING
Effects of preignition on pulverized coal combustion
[DOE/PC-30293/1] N81-23312
CHARTS
A general algorithm for the construction of contour plots
[NASA-TM-81287] N81-23813
CHECKOUT
Verification of payload specifications for Symphonie satellites N81-23110
CHEMICAL ANALYSIS
Alteration of the response of the electron capture detector by addition of oxygen to the carrier gas N81-23202
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste
[BNL-28668] N81-23228
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489
Method for analysis of organic compounds in the Great Lakes
[PB81-149783] N81-23578
CHEMICAL ATTACK
Assessment of gas turbine erosion. Volume 2: Erosion analysis and test planning
[PB81-139677] N81-23091
CHEMICAL BONDS
The role of chemical bonding in adhesion
[AD-A097388] N81-23281
The role of chemical bonding in the adhesion of elastomers
[AD-A097223] N81-23282
CHEMICAL LASERS
KrF laser fusion: Perform optical systems study of direct short pulse extraction
[DOE/DP-40069/3] N81-23454
CHEMICAL REACTIONS
Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226
Surface science and heterogeneous catalysts
[LBL-11690] N81-23230
Solid-state displacement reactions between iron and nickel oxide at 1000 C N81-23240
Hydrogen attack of pressure-vessel steel
[DOE/ER-02872/5] N81-23258
Refining and upgrading of synfuels from coal and oilshales by advanced catalytic processes
[FE-2315-58] N81-23311

Changes occurring in coal during in situ gasification
[IS-T-950] N81-23313
Coal gasification pilot plant support studies
[FE-2806-7] N81-23315

CHEMICAL REACTORS
Some topics in applied electrochemical kinetics
[AD-A097405] N81-23206
Particulate processes in pulverized coal flames
[DOE/PC-30300/T2] N81-23218
Pulverized fuel combustion: Modeling and scaleup mathodologies
[DOE/PC-30294/1] N81-23219
Program to discover materials suitable for service under hostile conditions obtaining in equipment for the gasification of coal and other solid fuels
[FE-1784-69] N81-23253
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30075/4] N81-23317
Fluidization using non-equilibrium thermodynamics
[PB81-153249] N81-23707

CHEMILUMINESCENCE
On the origins of homogeneous and inhomogeneous linewidths of the (D-5)0-(F-7)0 transition of Eu-3(+) in amorphous solids
[AD-A097614] N81-23212

CHINESE SPACE PROGRAMS
The Symphonie experiment in China N81-23112

CHLORIDES
Alteration of the response of the electron capture detector by addition of oxygen to the carrier gas N81-23202
Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211

CHLORINATION
Recovery and separation of products from the high-temperature chlorination of fly ash
[IS-T-947] N81-23723
Chlorination of fly ash and bentonite with a gas mixture of silicon tetrachloride and chrlorine
[IS-T-920] N81-23724

CHLOROCARBONS
Economic implications of regulating nonaerosol chlorofluorocarbon emission: An executive briefing
[PB81-146698] N81-23735
Flexible urethane foams and chlorofluorocarbon emissions: A support document for economic implications of regulating chlorofluorocarbon emissions from nonaerosol applications
[PB81-146706] N81-23736

CHLOROPHYLLS
Physical and chemical studies of chlorophyll in microemulsions
[DOE/ER-04452/3] N81-23788

CHROMATOGRAPHY
Ion chromatography with low-capacity resins and low conductivity eluents
[IS-T-916] N81-23221

CHROMIUM
Electrolytic reduction of chromium (6) and copper using coke electrodes
[PB81-148249] N81-23263

CHROMIUM ALLOYS
Electrochemical corrosion of iron-chromium alloys under ultra-high-purity conditions --- sulfuric acid solutions
[PB81-147134] N81-23271
X-ray diffraction study of residual stress in model weldments
[UCRL-15332] N81-23504

CIRCLES (GEOMETRY)
Distributions on the circle and sphere
[AD-A097462] N81-23847

CIRCUIT DIAGRAMS
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871

CIRCUITS
Fault analysis of analog electronic systems: Algorithms based on fuzzy sets N81-23373

CITIES
Acceptance and operation of small receiving stations in urban areas N81-23137

CITRUS TREES
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543

CIVIL AVIATION
Description of the British Civil Aviation Airworthiness Data Recording Programme (CAADRP) --- analysis of flight recorder data N81-23017
General Aviation Activity and Avionics Survey
[AD-A097604] N81-23081

CLADDING
Cladding of metals to iron by vacuum rolling
[PB81-150096] N81-23476

CLASSIFICATIONS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
Statistical classification techniques for engineering and climatic data samples
[NASA-CR-164337] N81-23764

CLAYS
Test methods and results of a study of greases for use in roto-launch valve lubrication
[AD-A097565] N81-23289

CLIMATE
The effect of surface boundary conditions on the climate generated by a coarse-mesh general circulation model
[NASA-CR-164296] N81-23765
Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel
[AD-A097529] N81-23767
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780

CLIMATOLOGY
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759
Weather scenarios for central Germany
[AD-A097527] N81-23771

CLOCKS
A difference in efficiency between synchronous and asynchronous systems
[AD-A097476] N81-23381
A frequency and timing subsystem for the ORION mobile unit N81-23999

CLOUD PHYSICS
Development of infrared and microwave techniques for cloud parameter inference from satellite imagery and sounder data
[AD-A097592] N81-23770

CLUTTER
Detection thresholds for multitarget tracking in clutter
[AD-A097188] N81-23350

COAL
Coal combustion aerothermochemistry research
[DOE/ER-10029/T1] N81-23216
Particulate processes in pulverized coal flames
[DOE/PC-30300/T2] N81-23218
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste
[BNL-28668] N81-23228
Controlled burnout of wasted coal on abandoned coal mine lands
[PB81-148231] N81-23234
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
Effects of preignition on pulverized coal combustion
[DOE/PC-30293/1] N81-23312
Changes occurring in coal during in situ gasification
[IS-T-950] N81-23313
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels (riser cracking of coal)
[DOE/ET-10520/1] N81-23314
Flameproof television camera set for the observation of coal seams and rock strata as well as of tectonic surfaces in underground boreholes
[BMFT-FB-T-80-149] N81-23370
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T2] N81-23460
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T3] N81-23468
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550
Design optimization in underground coal systems. Volume 6: LHDSIM: A load-haul-dump simulator for room-and-pillar mining systems
[FE-1231-24-VOL-6] N81-23569
Coal resource information. Volume 1: Coal resource information requirements
[EPRI-EA-673-VOL-1] N81-23571
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
Design optimization in underground coal systems. Volume 9: Modified FACESIM and COST-SCHED programs
[FE-1231-27-VOL-9] N81-23574
Design optimization in underground coal systems. Volume 3: Structural characterization of coal
[FE-1231-21-VOL-3] N81-23575
Design optimization in underground coal systems. Volume 7: Prediction of mining subsidence and related parameters over longwall mining operations
[FE-1231-25] N81-23576
Review of horizontal drilling technology for methane drainage from U.S. coalbeds
[PB81-148181] N81-23590
International energy indicators
[DOE/IA-0010/8] N81-23655
Fluidized-bed combustion emissions: Toxicology program
[LMF-83] N81-23718
Development of a computer-aided method for the techno-economic evaluation of R and D projects in the mining area. Stage 1: Development of the concept and identification of application
[BMFT-FB-T-80-130] N81-23969

COAL DERIVED GASES
Effects of additives on methanation activity of Raney nickel catalysts
[BM-RI-8487] N81-23217
Analysis of the market and product costs for coal-derived high Btu gas: Staff working paper
[DOE/FE-0011] N81-23319
Pyrolysis of coal-derived fuels using the laser-powered homogeneous pyrolysis technique
[DOE/PC-30217/T1] N81-23320

COAL DERIVED LIQUIDS
Catalytic combustion of coal-derived liquid fuels
[EPRI-AP-1666] N81-23215
Pyrolysis of coal-derived fuels using the laser-powered homogeneous pyrolysis technique
[DOE/PC-30217/T1] N81-23320
Rheology, flow and atomization of coal-oil mixtures N81-23404
High-temperature turbine technology program turbine simulator tests with coal-derived low-Btu gas fuel
[FE-1806-92] N81-23473

COAL GASIFICATION
Pulverized fuel combustion: Modeling and scaleup mathodologies
[DOE/PC-30294/1] N81-23219
Program to discover materials suitable for service under hostile conditions obtaining in equipment for the gasification of coal and other solid fuels
[FE-1784-69] N81-23253
Weld overlaying for corrosion resistance in coal-gasification atmospheres
[FE-2621-15] N81-23254
Mechanisms of erosion/corrosion of metals and their oxide scales --- coal gasification pilot plant components
[LBL-12023] N81-23255
Industrial application of C-Es coal-gasification process
[FE-1545-86] N81-23308
Molten salt coal gasification process development unit, phase 2
[DOE/ET-10296/70] N81-23310
Changes occurring in coal during in situ gasification
[IS-T-950] N81-23313

Coal gasification pilot plant support studies
[FE-2806-7] N81-23315
Analysis of the market and product costs for coal-derived high Btu gas: Staff working paper
[DOE/FE-0011] N81-23319
Coal gasification availability analysis
[PB81-153272] N81-23321
High-temperature combustion gas turbine program
[NYSERDA-80-12] N81-23470
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692
Hot-gas desulfurization. 1: Use of gasifier ash in a fixed-bed process
[DOE/ET-10463/T1-VOL-1] N81-23716

COAL LIQUEFACTION
Refining and upgrading of synfuels from coal and oilshales by advanced catalytic processes
[FE-2315-58] N81-23311

COAL UTILIZATION
Assessment of gas turbine erosion. Volume 1: Assessment of available erosion data
[PB81-139685] N81-23092
Metallic species derived from fluidized bed coal combustion
[DOE/MC-08196/T1] N81-23257
Coal gasification availability analysis
[PB81-153272] N81-23321
Construction procedures using self hardening fly ash
[PB81-153884] N81-23334
Coal resource information. Volume 1: Coal resource information requirements
[EPRI-EA-673-VOL-1] N81-23571
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
Health and safety: Preliminary comparative assessment of the Satellite Power System (SPS) and other energy alternatives
[NASA-CR-164215] N81-23594
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Fuel cell power plant integrated systems evaluation
[EPRI-EM-1670] N81-23694
Molten carbonate fuel cell large stack development
[PB81-145930] N81-23708

COASTAL WATER
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560
Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785

COASTS
A general inverse solution for 2D edge waves
[AD-A097683] N81-23748

COAXIAL PLASMA ACCELERATORS
Compact toroids generated by a magnetized coaxial source in the CTX experiment
[LA-UR-81-325] N81-23917

COBALT
Availability of copper, nickel, cobalt and manganese from ocean ferromanganese nodules (3)
[PB81-145971] N81-23747

COCKPITS
Effects of curved approach paths and advanced displays on pilot scan patterns
[NASA-TP-1846] N81-23791

CODE DIVISION MULTIPLE ACCESS
Experimentation with a Spread Spectrum Multiple Access communication system via the Symphonie satellite N81-23115

CODES
GPSAP/V2 with applications to open-cycle MHD systems
[ANL/MHD-80-15] N81-23908

COGENERATION
Advanced system demonstration for utilization of biomass as an energy source. Site study report --- site selection in Maine
[DOE/ET-20055/T1] N81-23662
Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-1] N81-23665
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3, book 2: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-2] N81-23666
Advanced system demonstration for utilization of biomass as an energy source. Volume 4: Design drawings
[DOE/ET-20055/T2-VOL-4] N81-23667
Fuel cell power plant integrated systems evaluation
[EPRI-EM-1670] N81-23694

COKE
Electrolytic reduction of chromium (6) and copper using coke electrodes
[PB81-148249] N81-23263

COLD WEATHER
Building under cold climates and on permafrost. Collection of papers from a US-Soviet Joint Seminar
[AD-A097516] N81-23327

COLLISION PARAMETERS
Interaction of slow electrons with high-pressure gases (quasi-liquids): Synthesis of our knowledge on slow electron-molecule interactions
[DOE/EV-04703/T1] N81-23875

COLONIES
Drag enhancement of microbial slime films on rotating discs
[AD-A097228] N81-23787

COLOR
An investigation of several branching functions in a branch and bound algorithm for the chromatic number problem
[AD-A097330] N81-23820

COLORADO
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

COMBUSTION
Catalytic combustion of coal-derived liquid fuels
[EPRI-AP-1666] N81-23215
Controlled burnout of wasted coal on abandoned coal mine lands
[PB81-148231] N81-23234
Effects of preignition on pulverized coal combustion
[DOE/PC-30293/1] N81-23312

COMBUSTION CHAMBERS
Radiation/catalytic augmented combustion
[AD-A097442] N81-23208
Metallic species derived from fluidized bed coal combustion
[DOE/MC-08196/T1] N81-23257
An experimental and numerical comparison of turbulent flow over a step
[AD-A097141] N81-23420
High-reliability gas turbine combined-cycle development program. Phase 1: Summary
[EPRI-AP-1681-SU] N81-23471
High-reliability gas turbine combined-cycle development program, phase 1, volume 2
[EPRI-AP-1681-VOL-2] N81-23472

COMBUSTION EFFICIENCY
Dynamic burning effects in the combustion of solid propellants with cracks, and the use of granular bed combustion models
[AD-A097474] N81-23302
Experimental evaluation of catalytic combustion with heat removal at near stoichiometric conditions
[NASA-TM-81748] N81-23609

COMBUSTION PRODUCTS
Coal combustion aerothermochemistry research
[DOE/ER-10029/T1] N81-23216
Particulate processes in pulverized coal flames
[DOE/PC-30300/T2] N81-23218
Combustion system processes leading to corrosive deposits
[NASA-TM-81752] N81-23243
Test and evaluation of methanol in a gas turbine system
[EPRI-AP-1712] N81-23307
Fluidized-bed combustion emissions: Toxicology program
[LMF-83] N81-23718

COMMAND AND CONTROL
On-orbit control of the Communications Technology Satellite (CTS)/HERMES N81-23145
Challenges and opportunities in Air Forces tactical communications
[AD-A097677] N81-23352
Access protocol for a parallel wideband local digital communication network - proposed standard
[AD-A097354] N81-23357
Terms and axioms for a theory of human-machine systems N81-23796

COMMERCIAL AIRCRAFT
Commercial aviation icing research requirements
[NASA-CR-165336] N81-23069

COMMERCIAL ENERGY
Models for residential-and commercial-sector energy conservation analysis: Applications, limitations, and future potential
[DOE/PE-70044/T3] N81-23639
Financial study of commercialization of solar central receiver power systems
[DOE/SF-11421/1] N81-23640
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678

COMMUNICATION CABLES
A feasibility study for a versatile deep sea, multileg, stable, cable array
[AD-A097672] N81-23782

COMMUNICATION EQUIPMENT
Transportable ground stations --- for Symphonie N81-23140
Challenges and opportunities in Air Forces tactical communications
[AD-A097677] N81-23352

COMMUNICATION NETWORKS
Integration of satellite circuits in the terrestrial telecommunication network --- Symphonie satellite N81-23121
Transportable terminals for STEP N81-23138
Symphonie experiments and future applications of telecommunications satellites for the United Nations network N81-23158
Disaster relief communications via the Sympnonie satellite N81-23159
Market capture by 30/20 GHz satellite systems. Volume 1: Executive summary
[NASA-CR-165231] N81-23345

Market capture by 30/20 GHz satellite systems, volume 2
[NASA-CR-165232] N81-23346
Access protocol for a parallel wideband local digital communication network - proposed standard
[AD-A097354] N81-23357
GRIDNET
[PB81-144370] N81-23372
A study of integrated switching techniques --- voice/data multiplexers
[AD-A097243] N81-23806
Second derivative algorithms for minimum delay distributed routing in networks
[AD-A097623] N81-23835
Database searching and document delivery via communications satellite
[AIP-80-1] N81-23944
Information services: Their organization, control and use --- conferences
[AGARD-CP-294] N81-23955
Euronet and its interlinking to other networks N81-23958
ARIANE: Building data bank N81-23961

COMMUNICATION SATELLITES
The role of telecommunication satellites in developing countries N81-23102
In-orbit control of geostationary satellites. Panel discussion C N81-23151
The French satellite telecommunications program: Telecom 1 N81-23167
Requirements for domestic and regional telecommunications satellites: Panel discussion E N81-23172
INTELSAT V-B (F-1) launch
[NASA-TM-82349] N81-23176
User's manual for strategic satellite system terminal segment life cycle cost model, volume 1
[AD-A097634] N81-23354
User's manual for strategic satellite system terminal segment life cycle cost model, volume 2
[AD-A097635] N81-23355

COMMUNICATIONS TECHNOLOGY SATELLITE
On-orbit control of the Communications Technology Satellite (CTS)/HERMES N81-23145
The CTS 11.7 GHz angle of arrival experiment
[NASA-CR-164338] N81-23740

COMPARISON
Two-way time transfers between National Research Council (Ottawa) and Paris Observatory via the Symphonie satellite N81-23134
Clock synchronization experiment via Symphonie satellite N81-23135
A time comparison experiment between Shangai and Paris via Symphonie satellite N81-23136
TNT equivalency of bulk nitrocellulose
[AD-A097472] N81-23303
An experimental comparison of pumped superluminal electromagnetic radiation to Cerenkov radiation
[AD-A097571] N81-23361
Preliminary assessment of the impact of flywheel energy storage technology on taxicab fleet operation in a large metropolitan city
[LA-8722-MS] N81-23685

COMPILERS
An adaptation of the ADA language for machine generated compilers
[AD-A097292] N81-23819

COMPONENT RELIABILITY
Location of faults in jet engines by calculation of component characteristics N81-23012
Reduction of measured data and possibilities for early detection of sensor break-down N81-23016
Symphonie: In-flight performance of telemetry-telecommand, power supply, thermal control and transponder subsystems N81-23149
Development of nondestructive evaluation techniques for high-temperature ceramic heat exchanger components
[ANL-80-123] N81-23292
Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters
[AD-A097283] N81-23438

COMPOSITE MATERIALS
Diffusion mechanisms and degradation of environmentally sensitive composite materials
[COO-444-9] N81-23196
Strain-dependent creep damage in random inhomogeneous materials
[AD-A097164] N81-23497

COMPOSITE STRUCTURES
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies
[NASA-CR-152336-1] N81-23064
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065
Composite materials for structural design --- polymer matrix composite materials
[AD-A097297] N81-23195
Stressed skin action in composite panels comprising steel sheeting and boards
[PB81-135733] N81-23331
Free torsional vibrations of a hollow cylinder with laminated periodic structure
[AD-A097163] N81-23496

COMPOSITION (PROPERTY)
Sulfide inclusions in electroslag remelted steels
[AD-A097469] N81-23250
Homogeneous and heterogeneous rubbery/rubbery diblock copolymers and polymer blends - A unified view
[AD-A097690] N81-23287

COMPRESSIBLE BOUNDARY LAYER
Compressible turbulent boundary layer interaction experiments
[NASA-CR-164292] N81-23415

COMPRESSIBLE FLOW
Studies of compressible shear flows and turbulent drag reduction
[NASA-CR-165690] N81-23414

COMPRESSION LOADS
Fatigue degradation in compressively loaded composite laminates --- graphite-epoxy composites
[NASA-CR-165681] N81-23192
Heat generation in aircraft tires under free rolling conditions
[NASA-CR-164273] N81-23461
Constitutive models for compressive loading of geologic materials
[UCRL-53073] N81-23757

COMPRESSIVE STRENGTH
Design optimization in underground coal systems. Volume 3: Structural characterization of coal
[FE-1231-21-VOL-3] N81-23575

COMPRESSOR BLADES
Investigation of the use of liquid crystal thermography to study flow over turbomachinery blades
[AD-A097289] N81-23089
The boundary layer on compressor cascade blades
[NASA-CR-164330] N81-23416

COMPUTATION
Use of the TI 59 with applications to probability and statistical analysis
[AD-A097384] N81-23807

COMPUTATIONAL FLUID DYNAMICS
Finite elements for fluid dynamics
[AD-A097215] N81-23424
Technical evaluation report on the Fluid Dynamic Panel Symposium on Subsonic/Transonic Configuration/Aerodynamics
[AGARD-AR-146] N81-23431

COMPUTER ASSISTED INSTRUCTION
Continuing education through computer-aided instruction
[LA-UR-81-82] N81-23935

COMPUTER COMPATIBLE TAPES
Documentation for the machine-readable version of an atlas of ultraviolet stellar spectra and a second atlas of ultraviolet stellar spectra from OAO 2 observations
[NASA-TM-82284] N81-23984

COMPUTER GRAPHICS
ATTACK vs SCAN: A comparison of endgame aircraft survivability computer programs
[AD-A097663] N81-23076
An investigation of several branching functions in a branch and bound algorithm for the chromatic number problem
[AD-A097330] N81-23820
Note on computer graphics for maximum entropy spectral analysis
[AD-A097121] N81-23822
Plasma physics plotting package
[LA-8161-M] N81-23921
Online microfilm recorders of Los Alamos National Laboratory
[LA-UR-81-284] N81-23953

COMPUTER NETWORKS
Computer networking experiment via the Symphonie satellite N81-23131
Distributed computing for advanced levels of machinery control N81-23458
Applicative specifications of distributed systems: Extending them to embedded systems
[AD-A097280] N81-23808
Online microfilm recorders of Los Alamos National Laboratory
[LA-UR-81-284] N81-23953

COMPUTER PROGRAMMING
Microprocessor generated vertical gyrohorizon instrument for the Blue Bird simulator
[AD-A097658] N81-23098
Use of the TI 59 with applications to probability and statistical analysis
[AD-A097384] N81-23807
Applicative specifications of distributed systems: Extending them to embedded systems
[AD-A097280] N81-23808
Evaluating a data abstraction testing system based on formal specifications
[AD-A097231] N81-23809
Deep space network software cost estimation model
[NASA-CR-164277] N81-23814
Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818
Software requirements: A report on the state of the art
[AD-A097278] N81-23821
GPSAP/V2 with applications to open-cycle MHD systems
[ANL/MHD-80-15] N81-23908
Data collection analysis and test
[AD-A097160] N81-23948

COMPUTER PROGRAMS
Investigation of aerodynamic characteristics of wings having vortex flow using different numerical codes
[NASA-CR-165706] N81-23034
Computer utilization in analytical instrumentation N81-23200
Coupled walls in earthquake-resistant buildings, modeling techniques and dynamic analysis
[PB81-132698] N81-23329
The finite element method for sheet metal structures - development of a computer program
[PB81-135725] N81-23330
The 100 MWe OTEC alternate power systems. Volume 2: Appendices
[ORO-1473-T1-VOL-2-1] N81-23392
Electric utility value determination for wind energy. Volume 1: A methodology
[SERI/TR-732-604-VOL-1] N81-23393
Multinozzle plume flowfields
[AD-A097244] N81-23419
STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469
MEGA16 - Computer program for analysis and extrapolation of stress-rupture data
[NASA-TP-1809] N81-23486
Design optimization in underground coal systems. Volume 9: Modified FACESIM and COST-SCHED programs
[FE-1231-27-VOL-9] N81-23574
Design optimization in underground coal systems. Volume 7: Prediction of mining subsidence and related parameters over longwall mining operations
[FE-1231-25] N81-23576
Study of a temperature-stabilized heat pipe system with electrical feedback
[IKE-5-196] N81-23649
Comparison between the SIMPLE and ENERGY mixing models
[DOE/ET-37240/78TR] N81-23703
Fluidization using non-equilibrium thermodynamics
[PB81-153249] N81-23707
An efficient code for the simulation of nonhydrostatic stratified flow over obstacles
[NASA-CR-3385] N81-23762
CDC/1000: A Control Data Corporation remote batch terminal emulator for Hewlett-Packard minicomputers
[SAND-80-2548] N81-23811

Software requirements: A report on the state of the art
[AD-A097278] N81-23821
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871
Atmospheric transmittance/radiance computer code FASCOD2
[AD-A097593] N81-23893
ONETWO: A computer code for modeling plasma transport in Tokamaks
[GA-A-16178] N81-23901
Plasma physics plotting package
[LA-8161-M] N81-23921
Model systems for the epitaxial growth and capping of GaAs
[AD-A097410] N81-23928

COMPUTER SYSTEMS DESIGN
Applicative specifications of distributed systems: Extending them to embedded systems
[AD-A097280] N81-23808
Decision graphs: A tool for developing real time software
[LA-UR-80-3502] N81-23823

COMPUTER SYSTEMS PROGRAMS
RAWINPROC: Computer program for decommutating, interpreting, and interpolating Rawinsonde meteorological balloon sounding data
[NASA-CR-164315] N81-23766

COMPUTER TECHNIQUES
Computer utilization in analytical instrumentation N81-23200
Multielement analysis studies by flame and inductively coupled plasma spectroscopy utilizing computer-controlled instrumentation
[PB81-149528] N81-23231
Research on parallelism in problem-solving systems
[AD-A097608] N81-23805
The design of computer based integrated information displays N81-23942
Euronet and its interlinking to other networks N81-23958

COMPUTERIZED DESIGN
An analytical procedure and automated computer code used to design model nozzles which meet MSFC base pressure similarity parameter criteria --- space shuttle
[NASA-CR-161757] N81-23187
Design optimization in underground coal systems. Volume 9: Modified FACESIM and COST-SCHED programs
[FE-1231-27-VOL-9] N81-23574

COMPUTERIZED SIMULATION
User's manual for flight Simulator Display System (FSDS)
[NASA-CR-164295] N81-23095
Polyurethane fan-out waveguide arrays and computer simulation to control crosstalk in imaging arrays N81-23340
User's manual for strategic satellite system terminal segment life cycle cost model, volume 1
[AD-A097634] N81-23354
User's manual for strategic satellite system terminal segment life cycle cost model, volume 2
[AD-A097635] N81-23355
New techniques in digital signal processing for synthetic aperture radar
[AD-A097279] N81-23365
Investigation of numerical modeling techniques for recirculations flows: Parts 1 and 2
[EPRI-CS-1665-PT-1] N81-23427
Shock spectrum calculation from acceleration time histories
[AD-A097162] N81-23755
An efficient code for the simulation of nonhydrostatic stratified flow over obstacles
[NASA-CR-3385] N81-23762
Computer simulation of human performance in electronic processed imagery systems
[AD-A097622] N81-23801
A study of avionics time division multiplex bus simulation
[AD-A097375] N81-23810
Deep space network software cost estimation model
[NASA-CR-164277] N81-23814
Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818
Multi-rate digital control systems with simulation applications. Volume 1: Technical report
[AD-A097549] N81-23825
Multi-rate digital control systems with simulation applications. Volume 2: Computer algorithms
[AD-A097550] N81-23826
Computer simulation of random variables and vectors with arbitrary probability distribution laws
[NASA-TP-1859] N81-23838
Particle simulation code for longitudinal dynamics of heavy ion beams
[LBL-12205] N81-23910
Computer simulation study of the structure of vacancies in grain boundaries
[DOE/ER-05002/15] N81-23931
Numerical techniques for lattice gauge theories
[BNL-29048] N81-23932
Poster error probability in the Mu-11 Sequential Ranging System N81-24001
New results on antenna arraying, part 1 N81-24012
Computer simulated building energy consumption for verification of energy conservation measures in network facilities N81-24017

CONCENTRATORS
Satellite Power Systems (SPS) concept definition study, exhibit F
[NASA-CR-161750] N81-23599
Advanced solar concentrator: Preliminary and detailed design
[NASA-CR-164316] N81-23623
Advanced solar concentrator: Executive summary
[NASA-CR-164318] N81-23624
Materials for high efficiency monolithic multigap concentrator solar cells
[SERI/TR-8081-1-T3] N81-23646
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652

CONCRETES
Improving the distribution and reducing the magnitude of pavement damage
[PB81-145864] N81-23333
Microstructural effects on the mechanical properties and thermal shock resistance of a high alumina refractory concrete N81-23479

CONFERENCES
Contributions to the 9th Symposium on aircraft integrated data systems --- Conferences
[ESA-TT-532] N81-23008
Boundary Layer Effects on Unsteady Airloads
[AGARD-CP-296] N81-23044
The utilization of nonterrestrial materials --- resources for solar power satellite construction
[NASA-TM-83106] N81-23099
Symphonie Symposium, 1980 N81-23101
Workshop of Arc By-Products in Gas Insulated Equipment
[EPRI-EL-80-8-LD] N81-23396
International Union of Theoretical and Applied Mechanics: 3rd Symposium on Creep in Structures
[AD-A097420] N81-23494
The physical basic of the ionosphere in the solar-terrestrial system
[AGARD-CP-295] N81-23507
Symposium on the transfer and utilization of particulate control technology. Volume 3: Particulate control devices
[PB81-144800] N81-23734
Information services: Their organization, control and use --- conferences
[AGARD-CP-294] N81-23955
Telecommunications and data acquisition
[NASA-CR-164288] N81-23997

CONFIGURATION MANAGEMENT
Electronic flight rules: An alternative separation assurance concept
[AD-A097570] N81-23063
A feasibility study for a versatile deep sea, multileg, stable, cable array
[AD-A097672] N81-23782

CONFORMAL MAPPING
Studies of compressible shear flows and turbulent drag reduction
[NASA-CR-165690] N81-23414

CONGRESSIONAL REPORTS
Oil and natural gas from Alaska, Canada, and Mexico: Only limited help for US
[EMD-80-72] N81-23552
Federal-State environmental programs: The State perspective
[CED-80-106] N81-23711
National Aeronautics and Space Administration Authorization Act, 1982
[H-REPT-97-32] N81-23971
National Aeronautics and Space Administration Authorization Act, 1982
[S-REPT-97-100] N81-23973

CONIFERS
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

CONSOLES
A preliminary study of head-up display assessment techniques. 2: HUD symbology and panel information search time
[NASA-TM-78536] N81-23799

CONSTITUTIVE EQUATIONS
Constitutive models for compressive loading of geologic materials
[UCRL-53073] N81-23757

CONSTRAINTS
The theory of flammability limits. Conductive-convective wall losses and thermal quenching
[PB81-150047] N81-23233
QP-based methods for large-scale nonlinearly constrained optimization
[AD-A097407] N81-23830
Recursive least squares with linear constraints
[UCRL-85330] N81-23837

CONSTRUCTION
Building under cold climates and on permafrost. Collection of papers from a US-Soviet Joint Seminar
[AD-A097516] N81-23327

CONSTRUCTION INDUSTRY
ARIANE: Building data bank N81-23961

CONSTRUCTION MATERIALS
Linear-elastic and elastic plastic fracture mechanics of structural materials --- J integral method
[ESA-TT-649] N81-23505

CONSUMABLES (SPACECREW SUPPLIES)
Evaluation of engineered foods for Closed Ecological Life Support System (CELSS)
[NASA-CR-160952] N81-23800

CONTAINMENT
Review of high-level waste form properties
[PNL-3035] N81-23882

CONTAMINANTS
Lagrangian measurement platform flights in support of the Tennessee Plume Study: Field effort and data
[SAND-79-1336] N81-23717
Sensitivity and response time improvements in millimeter-wave spectrometers
[LBL-8789] N81-23726

CONTINENTAL SHELVES
Flux of energy and essential elements through the continental shelf ecosystem
[DOE/EV-00639/22] N81-23728

CONTINUUM MECHANICS
The elasto-plastic behavior of inclusions N81-23238
Research in laser processes
[AD-A097563] N81-23449
Impact and penetration problems
[AD-A097413] N81-23463

CONTOURS
A general algorithm for the construction of contour plots
[NASA-TM-81287] N81-23813

CONTROL BOARDS
Signal selector, spectrum receivers and touch panel control for the SATCOM signal analyzer
[AD-A097532] N81-23360
The design of computer based integrated information displays N81-23942

CONTROL SURFACES
Some remarks on the unsteady airloads on oscillating control surfaces in subsonic flow N81-23055

CONTROL THEORY
Bounded error adaptive control, part 1
[AD-A097628] N81-23824
Multi-rate digital control systems with simulation applications. Volume 1: Technical report
[AD-A097549] N81-23825
Multi-rate digital control systems with simulation applications. Volume 2: Computer algorithms
[AD-A097550] N81-23826

Controllability for distributed bilinear systems
[AD-A097411] N81-23828

CONTROLLED FUSION
Stable heating and burn simulations of a reversed-field pinch reactor
[COO-2218-189] N81-23918

CONVECTION CLOUDS
Ionospsheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760

CONVERGENCE
Topology of three-dimensional separated flows
[NASA-TM-81294] N81-23037

COOLING
The effect of cooling rate on the apparent bond strength of porcelain-metal couples
[AD-A097492] N81-23279

COOLING SYSTEMS
High-temperature combustion gas turbine program
[NYSERDA-80-12] N81-23470

COPOLYMERS
Homogeneous and heterogeneous rubbery/rubbery diblock copolymers and polymer blends - A unified view
[AD-A097690] N81-23287

COPPER
Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211
Electrolytic reduction of chromium (6) and copper using coke electrodes
[PB81-148249] N81-23263
Glass ceramics for sealing to high-thermal-expansion metals
[SAND-80-2192] N81-23297
Availability of copper, nickel, cobalt and manganese from ocean ferromanganese nodules (3)
[PB81-145971] N81-23747
Defect chemistry and characterization of Hg(1-x)Cd(x)Te
[NASA-CR-161746] N81-23924

COPPER SULFIDES
Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661

CORE SAMPLING
Shaft design in the Coeur d'Alene Mining District, Idaho: Results of in situ stress and physical property measurements
[PB81-148199] N81-23591

CORN
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

CORROSION
Assessment of gas turbine erosion. Volume 2: Erosion analysis and test planning
[PB81-139677] N81-23091
Assessment of gas turbine erosion. Volume 1: Assessment of available erosion data
[PB81-139685] N81-23092
Combustion system processes leading to corrosive deposits
[NASA-TM-81752] N81-23243
Synergistic erosion/corrosion of superalloys in PFB coal combustor effluent
[NASA-TM-81715] N81-23245
Localized corrosion in materials for geothermal power --- using brines with and without saturated hydrogen sulfide
[DOE/ET-28317/T1] N81-23256
Localized corrosion and stress-corrosion cracking behavior of stainless steel weldments
[DOE/ER-02462/T1] N81-23261
Corrosion Research Center of the University of Minnesota
[DOE/ER-10450/1] N81-23294

CORROSION PREVENTION
Corrosion Research Center of the University of Minnesota
[DOE/ER-10450/1] N81-23294
Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619

CORROSION RESISTANCE
Amorphous and microcrystalline thin films of iron-base alloys for corrosion resistant coatings N81-23235
Weld overlaying for corrosion resistance in coal-gasification atmospheres
[FE-2621-15] N81-23254
Atmospheric corrosion resistance of steels prepared from the magnetic fraction of urban refuse
[PB81-148215] N81-23265
Electrochemical corrosion behavior of alloys formed by ion implantation
[PB81-135006] N81-23266
Characterization of alloys formed by ion implantation
[PB81-148223] N81-23270
Development of a water displacing, touch-up paint
[AD-A097125] N81-23288
Corrosion Research Center of the University of Minnesota
[DOE/ER-10450/1] N81-23294
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299
Application of ion implantation for the improvement of localized corrosion resistance of M50 steel bearings
[AD-A097230] N81-23466

CORROSION TESTS
Assessment of gas turbine erosion. Volume 2: Erosion analysis and test planning
[PB81-139677] N81-23091

COST ANALYSIS
Analysis of the market and product costs for coal-derived high Btu gas: Staff working paper
[DOE/FE-0011] N81-23319
Solar energy system economic evaluation for Wormser Columbia, South Carolina
[NASA-CR-161722] N81-23605
Solar energy system economic evaluation for Colt Pueblo, Pueblo, Colorado
[NASA-CR-161725] N81-23607
Assessment of disk MHD generators for a base load powerplant
[NASA-TM-82609] N81-23611
Microprocessor control of a ground water heat pump
[DOE/R5-10149/2] N81-23658
Preliminary assessment of the impact of flywheel energy storage technology on taxicab fleet operation in a large metropolitan city
[LA-8722-MS] N81-23685
Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722
An empirical model building criterion based on prediction with applications in parametric cost estimation
[AD-A097535] N81-23852
Parametric cost methodology
[AD-A097537] N81-23855
A cost function for military airframes
[AD-A097538] N81-23966
Development of a computer-aided method for the techno-economic evaluation of R and D projects in the mining area. Stage 1: Development of the concept and identification of application
[BMFT-FB-T-80-130] N81-23969
Some propositions on cost functions
[AD-A097539] N81-23970

COST EFFECTIVENESS
Analysis and evaluation in the production process and equipment area of the low-cost solar array project
[DOE/JPL-954796-81/12] N81-23622
Fuel cell power plant integrated systems evaluation
[EPRI-EM-1670] N81-23694

COST ESTIMATES
Advanced solar concentrator: Executive summary
[NASA-CR-164318] N81-23624
An empirical model building criterion based on prediction with applications in parametric cost estimation
[AD-A097535] N81-23852
Parametric cost methodology
[AD-A097537] N81-23855
A cost function for military airframes
[AD-A097538] N81-23966
A cost function for an airframe production program
[AD-A097540] N81-23967

COST REDUCTION
F-16 integrated logistics support: Still time to consider economical alternatives
[PB81-137473] N81-23079

COSTS
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta
[AD-A097429] N81-23774

COTTON
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

COUPLING
An investigstion of the effects of mutual coupling on the performance of microstrip radiation
[AD-A097556] N81-23383
Electrical coupling between the lower atmosphere and the ionosphere N81-23520
Attenuation and coupling of far infrared surface plasmons N81-23888

COVERINGS
Solar energy systems: Standards for cover plates for flat plate solar collectors
[PB81-147290] N81-23709

CRACK INITIATION
The relationship between deformation and fracture in two phase elasto-plastic equiaxed alloys N81-23241

CRACK PROPAGATION
The relationship between deformation and fracture in two phase elasto-plastic equiaxed alloys N81-23241
Flaw growth of 6Al-4V STA titanium in nitrogen tetroxide with low nitric oxide content
[NASA-CR-160945] N81-23242
The fracture morphology of nickel-base superalloys tested in fatigue and creep-fatigue at 650 C
[NASA-TM-81740] N81-23244
STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469
International Union of Theoretical and Applied Mechanics: 3rd Symposium on Creep in Structures
[AD-A097420] N81-23494
Coarsely random cracking in one-crack fatigue models
[AD-A097194] N81-23498

CRASH INJURIES
Simulation analysis of head/neck impact response for helmeted and unhelmeted motorcyclists
[PB81-145377] N81-23804

CREEP ANALYSIS
Diffusion mechanisms and degradation of environmentally sensitive composite materials
[COO-444-9] N81-23196

CREEP PROPERTIES
International Union of Theoretical and Applied Mechanics: 3rd Symposium on Creep in Structures
[AD-A097420] N81-23494
Strain-dependent creep damage in random inhomogeneous materials
[AD-A097164] N81-23497

CREEP RUPTURE STRENGTH
Creep and creep rupture of laminated graphite/epoxy composites
[NASA-CR-164297] N81-23193
MEGA16 - Computer program for analysis and extrapolation of stress-rupture data
[NASA-TP-1809] N81-23486

CREEP TESTS
Creep and creep rupture of laminated graphite/epoxy composites
[NASA-CR-164297] N81-23193
Microstructural changes following superplastic deformation of commercially pure titanium
[AD-A097277] N81-23247

CROP CALENDARS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

CROP GROWTH
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

CROP IDENTIFICATION
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

CROP VIGOR
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544

CROSS CORRELATION
Automatic methods in image processing and their relevance to map-making
[AD-A097377] N81-23566

CROSS FLOW
A study of real jet effects on the surface pressure distribution induced by a jet in a crossflow
[NASA-CR-166150] N81-23029

CROSSLINKING
Inexpensive cross-linked polymeric separators made from water soluble polymers
[NASA-TM-82619] N81-23205
The role of chemical bonding in the adhesion of elastomers
[AD-A097223] N81-23282

CROSSTALK
Polyurethane fan-out waveguide arrays and computer simulation to control crosstalk in imaging arrays N81-23340

CRUDE OIL
Oil and natural gas from Alaska, Canada, and Mexico: Only limited help for US
[EMD-80-72] N81-23552
Short-term energy outlook. Volume 2: Methodology
[DOE/EIA-0202/4-VOL-2] N81-23654
International energy indicators
[DOE/IA-0010/8] N81-23655

CRYOGENIC EQUIPMENT
Traction drive for cryogenic boost pump --- hydrogen oxygen rocket engines
[NASA-TM-81704] N81-23188

CRYOGENIC ROCKET PROPELLANTS
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161760] N81-23184
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161759] N81-23185

CRYSTAL DEFECTS
Infrared hole - Burning spectroscopy of matrix isolated ReO4(-) molecules N81-23447
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613
Defect structure of EFG silicon ribbon
[NASA-CR-164324] N81-23618
Defect chemistry and characterization of Hg(1-x)Cd(x)Te
[NASA-CR-161746] N81-23924
Defect chemistry and characterization Hg(1-x)Cd(x)Te
[NASA-CR-161755] N81-23925
Computer simulation study of the structure of vacancies in grain boundaries
[DOE/ER-05002/15] N81-23931

CRYSTAL GROWTH
Materials processing threshold report. 1: Semiconductor crystals for infrared detectors
[NASA-CR-161752] N81-23100
Development of a novel laser material for miniaturized laser systems
[AD-A097477] N81-23451
Modeling of thin-film GaAs growth
[NASA-CR-164317] N81-23926
Sequential purification and crystal growth for the production of low cost silicon substrates
[DOE/SERI-8119/3-4] N81-23930

CRYSTAL STRUCTURE
High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295

CRYSTALLITES
Crystallite sizes in polyethylene single crystals and melt-crystallized polyethylene samples N81-23923

CUMULATIVE DAMAGE
A single-expression formula for inverting strain-life and stress-strain relationships
[NASA-CR-165347] N81-23491

CUPOLAS
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267

CURTAINS
Solar passive ceiling system
[DOE/R5-10148/2] N81-23637

CURVATURE
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227

CURVED BEAMS
Vibration of curved beams N81-23484

CURVES (GEOMETRY)
Evaluation of magnetic helicity in homogeneous turbulence
[NASA-TM-82131] N81-23900

CUSHIONS
Study to develop improved fire resistant aircraft passenger seat materials
[NASA-CR-152408] N81-23058
Effect of vinyl and phenyl contents of silicone gum on the properties of the elastomers and cellular silicone cushions
[UCRL-53105] N81-23298

CUTTING
Machining with a round-nosed form tool N81-23457

CYBERNETICS
Bounded error adaptive control, part 1
[AD-A097628] N81-23824

CYCLONES
Tropical cyclone forecast verification as a function of reconnaissance platform
[AD-A097454] N81-23775
On the polarity of cyclostrophic flow in planetary atmospheres
[NASA-TM-82136] N81-23990

CYCLOTRON RADIATION
S-band microwave system, revision
[AD-A097641] N81-23348

CYCLOTRON RESONANCE
Analytical applications of ion cyclotron resonance mass spectroscopy N81-23201

CYLINDRICAL BODIES
Fluid forces on smooth and rough circular cylinders N81-23402
A numerical treatment of the dynamic motion of a zero bending rigidity cylinder in a viscous stream
[AD-A097450] N81-23426
Free torsional vibrations of a hollow cylinder with laminated periodic structure
[AD-A097163] N81-23496

CYLINDRICAL SHELLS
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227

D

D REGION
Experimental validation of the ONSOD Omega prediction method N81-23540

DAMAGE
Improving the distribution and reducing the magnitude of pavement damage
[PB81-145864] N81-23333

DAMAGE ASSESSMENT
Composite materials for structural design --- polymer matrix composite materials
[AD-A097297] N81-23195
Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters
[AD-A097283] N81-23438
Strain-dependent creep damage in random inhomogeneous materials
[AD-A097164] N81-23497

DATA
On the degree of inflation of measures of fit induced by empirical model building
[AD-A097536] N81-23856

DATA ACQUISITION
Navaids calibration evaluation with a computer-controlled avionics data acquisition system N81-23020
Summary of transponder data, May 1979 - November 1979
[AD-A097569] N81-23061
Active solar heating and cooling information user study
[SERI/TR-751-747] N81-23691
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 1: NDI maintenance data analysis
[AD-A097669] N81-23938
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 2: On-site data collection
[AD-A097670] N81-23939
Data collection analysis and test
[AD-A097160] N81-23948
Life-cycle cost database design and sample data development
[AD-A097222] N81-23949
System data structures for on-line distributed data base management system
[UCID-18912] N81-23950
Telecommunications and data acquisition
[NASA-CR-164288] N81-23997
Poster error probability in the Mu-11 Sequential Ranging System N81-24001
Frequency standard test facility data acquisition and processing system N81-24002
DSN scheduling system N81-24016

DATA BASES
Selection of secondary keys and indices for a database N81-23943
Database searching and document delivery via communications satellite
[AIP-80-1] N81-23944
Mechanical Properties Data Center
[AD-A097389] N81-23945
Life-cycle cost database design and sample data development
[AD-A097222] N81-23949
System data structures for on-line distributed data base management system
[UCID-18912] N81-23950
National Energy Information System basic concepts
[DOE/EIA-0229] N81-23951
National information services with international orientation N81-23959
ARIANE: Building data bank N81-23961
Reporting Capabilities and Management of the DSN Energy Data Base N81-24018

DATA COMPRESSION
Shock spectrum calculation from acceleration time histories
[AD-A097162] N81-23755
End-to-end quality measure for transmission of compressed imagery over a noisy coded channel N81-24007

DATA CONVERSION ROUTINES
Processing of AIDS flight recorder data for a quick look with the aid of a hybrid computer system N81-23023

DATA LINKS
Computer networking experiment via the Symphonie satellite N81-23131

Atmospheric optical communication systems
[AD-A097673] N81-23366

DATA MANAGEMENT

Biomass energy systems information user study
[SERI/TR-751-748] N81-23690

Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818

Selection of secondary keys and indices for a database N81-23943

System data structures for on-line distributed data base management system
[UCID-18912] N81-23950

The executives guide to data resource management
[PB81-153520] N81-23954

Portuguese scientific and technical information scene: Present status and future prospects N81-23957

Library records: In-house file creation versus external services N81-23964

DATA PROCESSING

Contributions to the 9th Symposium on aircraft integrated data systems --- Conferences
[ESA-TT-532] N81-23008

Description of the British Civil Aviation Airworthiness Data Recording Programme (CAADRP) --- analysis of flight recorder data N81-23017

The SYDAS flight data processing system N81-23018

Processing of AIDS flight recorder data for a quick look with the aid of a hybrid computer system N81-23023

Digital Avionics Information System (DAIS). Volume 1: Impact of DAIS concept on life cycle cost
[AD-A097339] N81-23083

Digital Avionics Information System (DAIS). Volume 2: Impact of DAIS concept on life cycle cost. Supplement
[AD-A097438] N81-23084

SUMS preliminary design and data analysis development --- shuttle upper atmosphere mass spectrometer experiment
[NASA-CR-165696] N81-23181

Data collection analysis and test
[AD-A097160] N81-23948

Frequency standard test facility data acquisition and processing system N81-24002

DATA PROCESSING EQUIPMENT

An integrated exhaust gas analysis system with self-contained data processing and automatic calibration
[NASA-TM-81592] N81-23435

DATA PROCESSING TERMINALS

CDC/1000: A Control Data Corporation remote batch terminal emulator for Hewlett-Packard minicomputers
[SAND-80-2548] N81-23811

DATA RECORDERS

A solid-state digital temperature recorder for space use
[NASA-TM-81267] N81-23434

DATA RECORDING

Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters
[AD-A097283] N81-23438

DATA REDUCTION

The SYDAS flight data processing system N81-23018

An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery
[NASA-CR-164279] N81-23562

Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565

RAWINPROC: Computer program for decommutating, interpreting, and interpolating Rawinsonde meteorological balloon sounding data
[NASA-CR-164315] N81-23766

DATA RETRIEVAL

Selection of secondary keys and indices for a database N81-23943

Database searching and document delivery via communications satellite
[AIP-80-1] N81-23944

Online microfilm recorders of Los Alamos National Laboratory
[LA-UR-81-284] N81-23953

Introduction of on-line searching in information services N81-23962

DATA SMOOTHING

The reconstruction of flight paths from AIDS data with the aid of modern filtering methods --- kalman filters N81-23021

DATA SYSTEMS

Selection of secondary keys and indices for a database N81-23943

DATA TRANSMISSION

A study of avionics time division multiplex bus simulation
[AD-A097375] N81-23810

DAYTIME

Dynamics of the dayside cusp aurora N81-23533

DECISION MAKING

Uncertainty measurement in a complex task as a function of response mode and event type characteristics
[AD-A097678] N81-23792

Decision graphs: A tool for developing real time software
[LA-UR-80-3502] N81-23823

Use of second order stochastic dominance in decision aiding
[AD-A097117] N81-23849

On sensitivity analysis in systems for planning and decision support
[AD-A097409] N81-23940

Multiple objective evaluation and choicemaking under risk with partial preference infomation
[AD-A097418] N81-23941

DECISION THEORY

Alternative frameworks for the reconciliation of probability assessments
[AD-A097584] N81-23850

DECODING

A decoding failure test for the transform decoder of Reed-Solomon code N81-24014

DECOMPOSITION

Multiphoton dissociation spectroscopy and photochemistry
[DOE/ER-10660/1] N81-23225

Workshop of Arc By-Products in Gas Insulated Equipment
[EPRI-EL-80-8-LD] N81-23396

DEEP SPACE NETWORK

Deep space network software cost estimation model
[NASA-CR-164277] N81-23814

Telecommunications and data acquisition
[NASA-CR-164288] N81-23997

Radio Astronomy N81-23998

Frequency standard test facility data acquisition and processing system N81-24002

Station stability measurement N81-24004

The reliability of multistate, multioutput systems N81-24011

Radio frequency interference protection of communications between the Deep Space Network and deep space flight projects N81-24015

DSN scheduling system N81-24016

Reporting Capabilities and Management of the DSN Energy Data Base N81-24018

DEER

Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

DEFECTS

Thermal analysis of malleable base white iron for quality control N81-23237

DEFENSE COMMUNICATIONS SYSTEM (DCS)

Access protocol for a parallel wideband local digital communication network - proposed standard
[AD-A097354] N81-23357

DEFORMATION

The relationship between deformation and fracture in two phase elasto-plastic equiaxed alloys N81-23241

Microstructural changes following superplastic deformation of commercially pure titanium
[AD-A097277] N81-23247

Large and small deformation finite element analysis of rolling contact N81-23482

The interaction of statistics and geology - finite deformations
[AD-A097463] N81-23746

DEGRADATION

Mechanisms of erosion/corrosion of metals and their oxide scales --- coal gasification pilot plant components
[LBL-12023] N81-23255

Degradation of the performance of communication systems in the presence of interference
[AD-A097685] N81-23369

DEICING

Commercial aviation icing research requirements
[NASA-CR-165336] N81-23069

DELAMINATING

Fatigue degradation in compressively loaded composite laminates --- graphite-epoxy composites
[NASA-CR-165681] N81-23192

Composite materials for structural design --- polymer matrix composite materials
[AD-A097297] N81-23195

DELTA MODULATION

Single Channel Per Carrier (SCPC) scheme: Delta modulation. Experimental Results --- Symphonie satellites N81-23119

DEMAND (ECONOMICS)

Market capture by 30/20 GHz satellite systems. Volume 1: Executive summary
[NASA-CR-165231] N81-23345

Market capture by 30/20 GHz satellite systems, volume 2
[NASA-CR-165232] N81-23346

Global energy consumption and production in 2000
[ORAU/IEA-81-2(M)] N81-23642

Regional comparisons of on-site solar potential in the residential and industrial sectors
[LBL-11789] N81-23695

DEMODULATORS

High speed front end of the multimegabit telemetry demodulator detector N81-24005

DENDROCHRONOLOGY

Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

DENITROGENATION

Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30075/4] N81-23317

DEOXYRIBONUCLEIC ACID

Bioassay of polycyclic aromatic hydrocarbons
[DOE/EV-04477/T2] N81-23677

DEPLOYMENT

The Symphonie ground stations N81-23107

DEPOLARIZATION

Thermally stimulated currents in glasses N81-23272

Thermally stimulated polarization and depolarization current (TSPC/TSDC) in glass N81-23273

DEPOSITION

Combustion system processes leading to corrosive deposits
[NASA-TM-81752] N81-23243

Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661

CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683

CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684

DESERTS

Soils of Israel and their similarity to soils of the United States
[AD-A097528] N81-23564

Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel
[AD-A097529] N81-23767

DESIGN ANALYSIS

Description of recent changes in the Langley 6- by 28-inch transonic tunnel
[NASA-TM-81947] N81-23096

Optimum design of untethered wave energy generation systems N81-23403

Analysis and evaluation in the production process and equipment area of the low-cost solar array project
[DOE/JPL-954796-81/12] N81-23622

Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909

DESULFURIZING
Hot-gas desulfurization. 1: Use of gasifier ash in a fixed-bed process
[DOE/ET-10463/T1-VOL-1] N81-23716
DETECTION
Detection thresholds for multitarget tracking in clutter
[AD-A097188] N81-23350
Detection of electrically failed photovoltaic modules at MIT LL test sites
[DOE/ET-20279/112] N81-23650
DETECTORS
High speed front end of the multimegabit telemetry demodulator detector N81-24005
DETONATION
Development of a gasless pyrotechnic cap
[AD-A097197] N81-23301
DEUTERIUM
D-D Tokamak reactor studies
[ANL/FPP/TM-138] N81-23907
DEUTERONS
Elastic scattering of polarized deuterons from hydrogen at 2.0, 1.6, and 1.2 GeV and search for critical opalescence in elastic scattering of protons from carbon-12 at 800 MeV
[LA-8662-T] N81-23872
DEVELOPING NATIONS
The role of telecommunication satellites in developing countries N81-23102
Studies and experiments by Eurospace in the field of education and public service --- Symphonie and third world countries N81-23154
DIELECTRICS
Immittance properties of large finite dielectric covered phased arrays N81-23341
A continuous dielectric separator for mineral beneficiation
[PB81-135014] N81-23581
An experimental study of electronic states at metal dielectric interfaces
[AD-A097363] N81-23929
DIESEL ENGINES
Diesel-exhaust emissions-toxicology program
[LMF-81] N81-23719
DIESEL FUELS
Microbial deterioration of marine diesel fuel from oil shale
[AD-A097674] N81-23304
DIFFERENTIAL EQUATIONS
Existence and uniqueness of solutions to a class of nonlinear-operator-differential equations arising in automated spaceship navigation
[NASA-TP-1860] N81-23182
The stability of second order quadratic differential equations, part 3
[AD-A097627] N81-23831
Polynomial approximation techniques for differential equations in electrochemical problems
[AD-A097631] N81-23833
Extended rate equations
[UCID-18932] N81-23879
DIFFUSION
Diffusion mechanisms and degradation of environmentally sensitive composite materials
[COO-444-9] N81-23196
Chemical diffusion on solid surfaces
[COO-4220-4] N81-23224
Dissipation and diffusion in nuclear fission
[LA-UR-81-301] N81-23883
DIGITAL COMPUTERS
New techniques in digital signal processing for synthetic aperture radar
[AD-A097279] N81-23365
Optimum design of hybrid phase locked loops N81-24010
DIGITAL DATA
GRIDNET
[PB81-144370] N81-23372
A solid-state digital temperature recorder for space use
[NASA-TM-81267] N81-23434
An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery
[NASA-CR-164279] N81-23562
Automatic methods in image processing and their relevance to map-making
[AD-A097377] N81-23566
DIGITAL FILTERS
Optimum design of hybrid phase locked loops N81-24010
DIGITAL SIMULATION
A nonlinear propulsion system simulation tehnique for piloted simulators
[NASA-TM-82600] N81-23085
A time domain simulation of a beam control system
[AD-A097423] N81-23453
DIGITAL SYSTEMS
Experiences with a Flight Data Recording System (FDRS) in a German Airforce fighter bomber wing after field trials --- digital equipment N81-23009
Digital Avionics Information System (DAIS). Volume 1: Impact of DAIS concept on life cycle cost
[AD-A097339] N81-23083
Digital Avionics Information System (DAIS). Volume 2: Impact of DAIS concept on life cycle cost. Supplement
[AD-A097438] N81-23084
Results of the 60 Mbit/s TDMA system. Tests via Symphonie N81-23114
The Celtic system: An experiment with Symphonie N81-23117
Single Channel Per Carrier (SCPC) scheme: Delta modulation. Experimental Results --- Symphonie satellites N81-23119
Experimental operation of a digital video transmission system --- Symphonie N81-23127
Access protocol for a parallel wideband local digital communication network - proposed standard
[AD-A097354] N81-23357
Degradation of the performance of communication systems in the presence of interference
[AD-A097685] N81-23369
Digital hand-held temperature monitor
[AD-A097130] N81-23441
CCD multi-level logic --- signal processing applications
[AD-A097586] N81-23816
Multi-rate digital control systems with simulation applications. Volume 1: Technical report
[AD-A097549] N81-23825
Multi-rate digital control systems with simulation applications. Volume 2: Computer algorithms
[AD-A097550] N81-23826
Studies in digital optical processing N81-23886
DIGITAL TECHNIQUES
Basic research planning in mathematical pattern recognition and image analysis
[NASA-CR-160946] N81-23561
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871
DIGITAL TELEVISION
Digital television transmission experiment via Symphonie N81-23128
Digital transmission tests of multiplexed video and audio signals at 60 Mbit/s via Orbital Test Satellite (OTS)
[BBC-RD-1980/16] N81-23342
DIPOLE MOMENTS
On source radiation
[NASA-CR-166176] N81-23343
DIRECT POWER GENERATORS
District heating from electric-generating plants and municipal incinerators: Local planners assessment guide
[ANL/CNSV-12] N81-23699
DIRECTIONAL ANTENNAS
Step tracking system --- for Symphonie N81-23141
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142
DIRECTIVITY
Three aspects of the statistics of directions
[AD-A097489] N81-23845
The Fisher-Bingham distribution on the sphere
[AD-A097475] N81-23846
Distributions on the circle and sphere
[AD-A097462] N81-23847
Antipodally symmetric distributions for orientation statistics
[AD-A097460] N81-23848
DISASTERS
Disaster relief communications via the Symphonie satellite N81-23159
DISCRIMINANT ANALYSIS (STATISTICS)
Statistical classification techniques for engineering and climatic data samples
[NASA-CR-164337] N81-23764
DISPERSING
Feasibility of large scale deliberate tracer release experiments in or below the oceanic thermocline
[DOE/EV-10038/1] N81-23783
DISPERSIONS
NOAA Meteorology Laboratory support to the Environmental Protection Agency
[PB81-149072] N81-23732
DISPLACEMENT
Solid-state displacement reactions between iron and nickel oxide at 1000 C N81-23240
DISPLAY DEVICES
A microcomputer-based signal data converter for runway visual range measurements
[AD-A097568] N81-23060
Summary of transponder data, May 1979 - November 1979
[AD-A097569] N81-23061
Demonstration Advanced Avionics System (DAAS) functional description --- Cessna 402B aircraft
[NASA-CR-152405] N81-23080
Digital Avionics Information System (DAIS). Volume 1: Impact of DAIS concept on life cycle cost
[AD-A097339] N81-23083
Digital Avionics Information System (DAIS). Volume 2: Impact of DAIS concept on life cycle cost. Supplement
[AD-A097438] N81-23084
User's manual for flight Simulator Display System (FSDS)
[NASA-CR-164295] N81-23095
Digital hand-held temperature monitor
[AD-A097130] N81-23441
Computer simulation of human performance in electronic processed imagery systems
[AD-A097622] N81-23801
Instructor/operator display evaluation methods
[AD-A097208] N81-23802
Sensor image prediction techniques
[AD-A097638] N81-23895
The design of computer based integrated information displays N81-23942
DISTANCE
Distances of random variables and point processes
[AD-A097621] N81-23827
DISTANCE MEASURING EQUIPMENT
Examination of distance measuring devices
[PB81-147332] N81-23445
A frequency and timing subsystem for the ORION mobile unit N81-23999
DISTRIBUTED AMPLIFIERS
A four-way distribution amplifier for reference signal distribution N81-24003
DISTRIBUTION FUNCTIONS
Asymptotic power of EDF statistics for exponentiality against Weibull and Gamma alternatives
[AD-A097107] N81-23841
DIURNAL VARIATIONS
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531
Experimental validation of the ONSOD Omega prediction method N81-23540
Changes of the Sq quiet daily variations of the geomagnetic field as a function of time of year and latitude
[AD-A097159] N81-23744
DOMESTIC ENERGY
Energy information referral directory, fourth quarter 1980
[DOE/EIA-0205(80-4Q)] N81-23952
Learning to look ahead: The need for a national materials policy and planning process
[EMD-79-30] N81-23974
DOMESTIC SATELLITE COMMUNICATIONS SYSTEMS
Transmission parameters of FDM/FM/FDMA telephone and FM television for domestic satellite system in China based on the experiment results via Symphonie N81-23164
Indian domestic satellite (INSAT) system N81-23168
Communication satellites in Canada N81-23169

DOPED CRYSTALS
Defect chemistry and characterization of Hg(1-x)Cd(x)Te
[NASA-CR-161746] N81-23924
Defect chemistry and characterization Hg(1-x)Cd(x)Te
[NASA-CR-161755] N81-23925
DOSIMETERS
Integral tests of fast neutron dosimetry cross sections
[EPRI-NP-1658] N81-23876
DRAG
Drag enhancement of microbial slime films on rotating discs
[AD-A097228] N81-23787
DRAG REDUCTION
Studies of compressible shear flows and turbulent drag reduction
[NASA-CR-165690] N81-23414
DRAINAGE
Review of horizontal drilling technology for methane drainage from U.S. coalbeds
[PB81-148181] N81-23590
DRAINAGE PATTERNS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
DRAWINGS
Advanced system demonstration for utilization of biomass as an energy source. Volume 4: Design drawings
[DOE/ET-20055/T2-VOL-4] N81-23667
DRILLING
Review of horizontal drilling technology for methane drainage from U.S. coalbeds
[PB81-148181] N81-23590
DRILLS
In-situ measurement of soil properties
[PB81-130064] N81-23328
DROP TESTS
Pioneer Venus probe models instrumented prop tests
[NASA-CR-164298] N81-23174
DROPS (LIQUIDS)
Experimental and theoretical investigation of droplet deposition and heat transfer in air-water dispersed flow N81-23409
DROUGHT
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
DUCTS
Investigation of heat transfer in straight and curved rectangular ducts
[AD-A097368] N81-23422
DURABILITY
Solar energy systems: Standards for cover plates for flat plate solar collectors
[PB81-147290] N81-23709
DYES
Studies of the photoelectrochemistry of organic dyes using attenuated total reflection techniques
[DOE/ER-10632/1] N81-23213
DYNAMIC LOADS
Assessment of existing studies of wind loading on solar collectors
[SERI/TR-632-812] N81-23501
Wind loading on tracking and field-mounted solar collectors
[SERI/TP-632-958] N81-23502
DYNAMIC MODELS
Experimental studies of partially defluidized bed with immersed heat exchange tubes N81-23407
DYNAMIC RESPONSE
Transonic flutter and gust-response tests and analyses of a wind-tunnel model of a torsion free wing airplane
[NASA-TM-81961] N81-23072
Response of nonlinear mechanical systems to random excitation. Part 1: Markov methods N81-23485
DYNAMIC STRUCTURAL ANALYSIS
The Shock and Vibration Digest, volume 13, no. 4
[AD-A097950] N81-23483
Vibration of curved beams N81-23484
Analytical testing
[NASA-CR-3429] N81-23487
DYNAMIC TESTS
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299

E

E REGION
Relations between solar flux and E-region parameters N81-23525
Energetic particle precipitation at middle and low latitudes N81-23526
EARTH (PLANET)
Status and future of extraterrestrial mapping programs
[NASA-CR-3390] N81-23989
EARTH ATMOSPHERE
Solar radiations and their interactions with the terrestrial environment N81-23509
Solar Terrestrial programs: A five year plan
[NASA-TM-82351] N81-23992
EARTH HYDROSPHERE
Contributions to a thermodynamic model of Earth systems on rivers
[NASA-CR-164272] N81-23506
EARTH LIMB
Earth limb radiance transformation
[AD-A097523] N81-23753
EARTH RESOURCES
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583
Learning to look ahead: The need for a national materials policy and planning process
[EMD-79-30] N81-23974
EARTHQUAKES
Coupled walls in earthquake-resistant buildings, modeling techniques and dynamic analysis
[PB81-132698] N81-23329
Shock spectrum calculation from acceleration time histories
[AD-A097162] N81-23755
Long-term measurements of ground motions offshore
[SAND-80-2718C] N81-23756
EAST GERMANY
Weather scenarios for central Germany
[AD-A097527] N81-23771
ECONOMIC ANALYSIS
Ethanol production in northern New York: Technical and economic feasibility
[PB81-144438] N81-23322
Electric utility value determination for wind energy. Volume 2: A user's guide
[SERI/TR-732-604-VOL-2] N81-23394
Potential impacts of Brayton and Stirling cycle engines
[NASA-CR-164278] N81-23603
Financial study of commercialization of solar central receiver power systems
[DOE/SF-11421/1] N81-23640
Economic analysis of the unified heliostat array
[DOE/SF-10802/1] N81-23657
Economic assessment of advanced central-receiver solar-thermal power systems
[DOE/SF-10601/1] N81-23681
Some propositions on cost functions
[AD-A097539] N81-23970
ECONOMIC DEVELOPMENT
The role of telecommunication satellites in developing countries N81-23102
Global energy consumption and production in 2000
[ORAU/IEA-81-2(M)] N81-23642
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678
ECONOMIC FACTORS
Solar energy system economic evaluation for Wormser Columbia, South Carolina
[NASA-CR-161722] N81-23605
Solar energy system economic evaluation for Colt Pueblo, Pueblo, Colorado
[NASA-CR-161725] N81-23607
Solar enhanced oil recovery: A potential early market for industrial solar energy
[SAND-80-1869C] N81-23702
Economic implications of regulating nonaerosol chlorofluorocarbon emission: An executive briefing
[PB81-146698] N81-23735
Flexible urethane foams and chlorofluorocarbon emissions: A support document for economic implications of regulating chlorofluorocarbon emissions from nonaerosol applications
[PB81-146706] N81-23736
ECONOMIC IMPACT
Development of a market methodology for assessing the impact of solar thermal-produced fuels and chemicals
[DOE/SF-12989/1] N81-23968
Introduction of electric vehicles into the utility system: Analysis of research needs
[EPRI-EM-1716] N81-23978
ECOSYSTEMS
Advanced system demonstration for utilization of biomass as an energy source, executive summary
[DOE/ET-20055/T3-EXEC-SUMM] N81-23596
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668
Flux of energy and essential elements through the continental shelf ecosystem
[DOE/EV-00639/22] N81-23728
EDITING
RAWINPROC: Computer program for decommutating, interpreting, and interpolating Rawinsonde meteorological balloon sounding data
[NASA-CR-164315] N81-23766
EDUCATIONAL TELEVISION
Satellites and communications: Transmissions between France and Quebec via Symphonie N81-23153
Outcome of Symphonie experiments in Ivory Coast N81-23155
EFFECTIVE PERCEIVED NOISE LEVELS
Lateral attenuation of high-by-pass ratio engined aircraft noise
[NASA-TM-81968] N81-23862
EFFERENT NERVOUS SYSTEMS
A motion cycle simulator for analysis and optimization of human power N81-23797
EFFLUENTS
Synergistic erosion/corrosion of superalloys in PFB coal combustor effluent
[NASA-TM-81715] N81-23245
EIGENVECTORS
Raman scattering by a molecule adsorbed at the surface of a thin metallic film
[IS-T-922] N81-23873
EINSTEIN EQUATIONS
Dynamic theory: A new view of space, time, and matter
[LA-8370-MS] N81-23934
ELASTIC DEFORMATION
Constitutive models for compressive loading of geologic materials
[UCRL-53073] N81-23757
ELASTIC PROPERTIES
Improving the distribution and reducing the magnitude of pavement damage
[PB81-145864] N81-23333
Some stability conditions for a compressible elastic material
[AD-A097351] N81-23500
Linear-elastic and elastic plastic fracture mechanics of structural materials --- J integral method
[ESA-TT-649] N81-23505
ELASTIC SCATTERING
Elastic scattering of polarized deuterons from hydrogen at 2.0, 1.6, and 1.2 GeV and search for critical opalescence in elastic scattering of protons from carbon-12 at 800 MeV
[LA-8662-T] N81-23872
Three-body helicity formalism applied to pion-deuteron scattering
[DOE/ER-05223/31] N81-23874
High-energy hadron-hadron collisions
[DOE/ER-00946/T1] N81-23877
ELASTOHYDRODYNAMICS
Lubrication fundamentals
[NASA-TM-81762] N81-23490

ELASTOMERS
Response of a plain and filled elastomer (Solithane 113) to high strain-rate compression, shear, and tension loading
[AD-A097455] N81-23278
The role of chemical bonding in adhesion
[AD-A097388] N81-23281
The role of chemical bonding in the adhesion of elastomers
[AD-A097223] N81-23282
Laboratory investigation of water-lubricated elastomeric bearings
[AD-A097109] N81-23464

ELASTOPLASTICITY
The elasto-plastic behavior of inclusions N81-23238
The relationship between deformation and fracture in two phase elasto-plastic equiaxed alloys N81-23241

ELECTRIC ARCS
Workshop of Arc By-Products in Gas Insulated Equipment
[EPRI-EL-80-8-LD] N81-23396

ELECTRIC AUTOMOBILES
Electric and hybrid vehicle program
[DOE/CS-0026/13] N81-23979

ELECTRIC BATTERIES
The electric moped
[DOE/R5-10157/2] N81-23976
Introduction of electric vehicles into the utility system: Analysis of research needs
[EPRI-EM-1716] N81-23978
Comparison of future battery systems for application to general-purpose electric vehicles
[UCRL-53092] N81-23980
Advanced electric vehicle
[UCRL-53089] N81-23981

ELECTRIC BRIDGES
Analytical applications of ion cyclotron resonance mass spectroscopy N81-23201

ELECTRIC CHOPPERS
Response of nickel to zinc cells to electric vehicle chopper discharge waveforms
[NASA-TM-81713] N81-23608

ELECTRIC CURRENT
A hybrid method which combines a moment method current with an asymptotic current N81-23377

ELECTRIC DISCHARGES
Response of nickel to zinc cells to electric vehicle chopper discharge waveforms
[NASA-TM-81713] N81-23608

ELECTRIC ENERGY STORAGE
Response of nickel to zinc cells to electric vehicle chopper discharge waveforms
[NASA-TM-81713] N81-23608

ELECTRIC FIELD STRENGTH
High-field effects in metal-aluminum oxide-silicon capacitors N81-23378
Advanced electrode design for electrostatic precipitators
[DOE/EV-10506/T1] N81-23395

ELECTRIC FIELDS
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531
On the structures and mapping of auroral electrostatic potentials
[NASA-CR-164336] N81-23741

ELECTRIC GENERATORS
The 100 MWe OTEC alternate power systems. Volume 2: Appendices
[ORO-1473-T1-VOL-2-1] N81-23392
Electric utility value determination for wind energy. Volume 1: A methodology
[SERI/TR-732-604-VOL-1] N81-23393
Analyses of mixed-hydrocarbon binary thermodynamic cycles for moderate-temperature geothermal resources
[EGG-PG-G-80-041] N81-23644
District heating from electric-generating plants and municipal incinerators: Local planners assessment guide
[ANL/CNSV-12] N81-23699

ELECTRIC HYBRID VEHICLES
Electric and hybrid vehicles charge efficiency tests of ESB EV-106 lead acid batteries
[NASA-CR-164283] N81-23602
Electric and hybrid vehicle program
[DOE/CS-0026/13] N81-23979

ELECTRIC MOTOR VEHICLES
Electric and hybrid vehicles charge efficiency tests of ESB EV-106 lead acid batteries
[NASA-CR-164283] N81-23602
Development of a lead-acid battery with high energy and power density
[BMFT-FB-T-80-151] N81-23653
Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722
Introduction of electric vehicles into the utility system: Analysis of research needs
[EPRI-EM-1716] N81-23978
Electric and hybrid vehicle program
[DOE/CS-0026/13] N81-23979
Comparison of future battery systems for application to general-purpose electric vehicles
[UCRL-53092] N81-23980
Advanced electric vehicle
[UCRL-53089] N81-23981

ELECTRIC POWER PLANTS
High-reliability gas turbine combined-cycle development program. Phase 1: Summary
[EPRI-AP-1681-SU] N81-23471
High-reliability gas turbine combined-cycle development program, phase 1, volume 2
[EPRI-AP-1681-VOL-2] N81-23472
Advanced system demonstration for utilization of biomass as an energy source, executive summary
[DOE/ET-20055/T3-EXEC-SUMM] N81-23596
Assessment of disk MHD generators for a base load powerplant
[NASA-TM-82609] N81-23611
Advanced system demonstration for utilization of biomass as an energy source. Site study report --- site selection in Maine
[DOE/ET-20055/T1] N81-23662
Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-1] N81-23665
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3, book 2: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-2] N81-23666
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678
Economic assessment of advanced central-receiver solar-thermal power system. Executive summary
[DOE/SF-10601/T1] N81-23680
Economic assessment of advanced central-receiver solar-thermal power systems
[DOE/SF-10601/1] N81-23681
Economic assessment of advanced central-receiver solar-thermal power systems: PG and E assessment
[DOE/SF-10601/2] N81-23682
Preliminary analysis of two aspects of magma-powered electric-generation plants
[SAND-80-1522] N81-23687
Solar thermal electric power information user study
[SERI/TR-751-750] N81-23689
Guide for the assessment of the reliability of gasification-combined-cycle power plants
[EPRI-AP-1610] N81-23704
The Coolidge Solar Irrigation Project
[SAND-80-2378] N81-23705
Molten carbonate fuel cell large stack development
[PB81-145930] N81-23708
US Department of Energy environmental compliance program handbook: Federal regulations on air quality, fossile energy
[ORNL/EIS-176] N81-23727
Symposium on the transfer and utilization of particulate control technology. Volume 3: Particulate control devices
[PB81-144800] N81-23734

ELECTRICAL FAULTS
Fault analysis of analog electronic systems: Algorithms based on fuzzy sets N81-23373
Detection of electrically failed photovoltaic modules at MIT LL test sites
[DOE/ET-20279/112] N81-23650

ELECTRICAL GROUNDING
Guide to substation grounding and bonding for mine power systems
[PB81-148264] N81-23592

ELECTRICAL IMPEDANCE
Immittance properties of large finite dielectric covered phased arrays N81-23341

ELECTRICAL PROPERTIES
Defect structure of EFG silicon ribbon
[NASA-CR-164324] N81-23618
High efficiency thin film CdTe solar cells
[SERI/PR-9133-1-T1] N81-23641
Influence of grain boundaries on the electrical properties of polycrystalline-silicon films
[DOE/ER-02699/T2] N81-23933

ELECTRICAL RESISTIVITY
Electrodynamics of the lower ionosphere N81-23516
Performance of high resistivity n+pp+ silicon solar cells under 1 MeV electron irradiation
[NASA-TM-82610] N81-23626

ELECTRO-OPTICS
Thin film optical devices and quantum electronics
[AD-A097246] N81-23450
Novel passive and active optical devices in waveguide structures N81-23887
Feasibility study of a microprocessor based oculometer system
[NASA-CR-164286] N81-23889
Wavelength division multiplexing: Overview of the state of the art
[AD-A097587] N81-23896

ELECTROCATALYSTS
Bioelectrocatalysis using chemically modified electrodes N81-23204

ELECTROCHEMICAL CELLS
Electrochemical photovoltaic cells CdSe thin film electrodes
[SERI/TR-8002-8-T1] N81-23676
The electric moped
[DOE/R5-10157/2] N81-23976

ELECTROCHEMICAL CORROSION
Electrochemical corrosion behavior of alloys formed by ion implantation
[PB81-135006] N81-23266
Electrochemical corrosion of iron-chromium alloys under ultra-high-purity conditions --- sulfuric acid solutions
[PB81-147134] N81-23271

ELECTROCHEMICAL OXIDATION
Bioelectrocatalysis using chemically modified electrodes N81-23204

ELECTROCHEMISTRY
Factors influencing the redox reactions of iron porphyrins N81-23197
The role of microcomputers in trace metal analysis N81-23198
The development of two novel spectroelectrochemical techniques N81-23203
Some topics in applied electrochemical kinetics
[AD-A097405] N81-23206
Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211
Amorphous and microcrystalline thin films of iron-base alloys for corrosion resistant coatings N81-23235
Experimental investigations of certain side reactions and the initial voltage transient for FeS2 cathodes in thermal batteries
[SAND-80-2341] N81-23399
Polynomial approximation techniques for differential equations in electrochemical problems
[AD-A097631] N81-23833

ELECTRODEPOSITION
Extremely uniform electrodeposition of submicron Schottky contacts
[AD-A097657] N81-23385

ELECTRODES
Kinetic studies of heterogeneous biocatalysis using the rotating ring-disk enzyme electrode N81-23199
Bioelectrocatalysis using chemically modified electrodes N81-23204

Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211
Advanced electrode design for electrostatic precipitators
[DOE/EV-10506/T1] N81-23395
Development of a lead-acid battery with high energy and power density
[BMFT-FB-T-80-151] N81-23653
Electrochemical photovoltaic cells CdSe thin film electrodes
[SERI/TR-8002-8-T1] N81-23676

ELECTRODYNAMICS
The physical basic of the ionosphere in the solar-terrestrial system
[AGARD-CP-295] N81-23507
Electrodynamics of the lower ionosphere N81-23516

ELECTROJETS
Plasma instabilities in the electrojets N81-23532
Dynamics of the dayside cusp aurora N81-23533
Ultimate limits to error probabilities for ionospheric models based on solar geophysical indices and how these compare with the state of the art N81-23538

ELECTROLYTES
Development of a lead-acid battery with high energy and power density
[BMFT-FB-T-80-151] N81-23653

ELECTROLYTIC CELLS
Electrolytic reduction of chromium (6) and copper using coke electrodes
[PB81-148249] N81-23263

ELECTROMAGNETIC ABSORPTION
The development of two novel spectroelectrochemical techniques N81-23203
The physics of radio wave absorption --- ionosphere N81-23515
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754

ELECTROMAGNETIC INTERACTIONS
The development and application of novel methods for the solution of EMP shielding problems
[AD-A097362] N81-23356

ELECTROMAGNETIC INTERFERENCE
Interference cancellation in self-cohering arrays N81-23337
Suppression of narrowband interference in pseudo-noise spread spectrum systems
[AD-A097336] N81-23368
Degradation of the performance of communication systems in the presence of interference
[AD-A097685] N81-23369

ELECTROMAGNETIC PULSES
The development and application of novel methods for the solution of EMP shielding problems
[AD-A097362] N81-23356

ELECTROMAGNETIC RADIATION
An experimental comparison of pumped superluminal electromagnetic radiation to Cerenkov radiation
[AD-A097571] N81-23361
Combined radiation and conduction in a nongray participating medium that absorbs, emits, and anisotropically scatters N81-23406

ELECTROMAGNETIC SCATTERING
Electromagnetic scattering by open circular waveguides --- engine inlets N81-23339

ELECTROMAGNETIC SHIELDING
The development and application of novel methods for the solution of EMP shielding problems
[AD-A097362] N81-23356

ELECTROMAGNETIC SURFACE WAVES
Attenuation and coupling of far infrared surface plasmons N81-23888
An experimental study of electronic states at metal dielectric interfaces
[AD-A097363] N81-23929

ELECTRON BEAM WELDING
X-ray diffraction study of residual stress in model weldments
[UCRL-15332] N81-23504

ELECTRON BEAMS
Demonstration of Pulsed Electron Beam Applications (PEBA) for fabricating small geometry semiconductor devices
[AD-A097547] N81-23382

ELECTRON CAPTURE
Alteration of the response of the electron capture detector by addition of oxygen to the carrier gas N81-23202

ELECTRON DENSITY (CONCENTRATION)
Midlatitude sporadic-E layers N81-23530
Plasma instabilities in the electrojets N81-23532
The day-by-day variability of the ionospheric peak density N81-23539

ELECTRON DENSITY PROFILES
Quantitative measurements in laser-induced plasmas using optical probing
[COO-4001-8] N81-23912

ELECTRON DIFFRACTION
Low-energy electron diffraction study of the surface-defect structure Ge grown epitaxially on GaAs(110)
[AD-A097599] N81-23927

ELECTRON EMISSION
The emission of electrons and positive ions from fracture of materials
[AD-A097390] N81-23194

ELECTRON ENERGY
MFTF Thomson scattering: A system study
[UCRL-53051] N81-23371
Structure of electron temperature --- satellite measurements of the ionospheric electron temperature and density N81-23529

ELECTRON IRRADIATION
Performance of high resistivity n+pp+ silicon solar cells under 1 MeV electron irradiation
[NASA-TM-82610] N81-23626

ELECTRON MICROSCOPES
Defect structure of EFG silicon ribbon
[NASA-CR-164324] N81-23618

ELECTRON MICROSCOPY
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489

ELECTRON MOBILITY
The effect of minority carrier mobility variations on solar cell spectral response
[NASA-TM-82604] N81-23625
Defect chemistry and characterization of Hg(1-x)Cd(x)Te
[NASA-CR-161746] N81-23924
Defect chemistry and characterization Hg(1-x)Cd(x)Te
[NASA-CR-161755] N81-23925

ELECTRON PARAMAGNETIC RESONANCE
ESR studies of surface adsorption and catalysts under ultrahigh vacuum conditions
[DOE/ER-04991/2] N81-23229

ELECTRON PRECIPITATION
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754

ELECTRON TRANSFER
Hollow-fiber membranes for photosensitized electron transport
[LBL-12359] N81-23220
Magnetic-field effects on photosensitized electron transfer reactions
[LBL-12361] N81-23222
Kinetics of photosensitized electron transport across a membrane boundary
[LBL-12360] N81-23223
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754

ELECTRONIC COUNTERMEASURES
Channel measurement decoding for troposcatter communications
[AD-A097620] N81-23367

ELECTRONIC EQUIPMENT
Detection of electrically failed photovoltaic modules at MIT LL test sites
[DOE/ET-20279/112] N81-23650

ELECTRONIC EQUIPMENT TESTS
Verification of payload specifications for Symphonie satellites N81-23110
Results of the 60 Mbit/s TDMA system. Tests via Symphonie N81-23114
Single Channel Per Carrier (SCPC) scheme: Delta modulation. Experimental Results --- Symphonie satellites N81-23119
Television with multiple audio facility using time division multiplexing --- Symphonie satellites N81-23130

ELECTROREFINING
Silver recovery from aircraft scrap
[PB81-150021] N81-23269

ELECTROSLAG WELDING
Sulfide inclusions in electroslag remelted steels
[AD-A097469] N81-23250

ELECTROSTATIC PRECIPITATORS
Advanced electrode design for electrostatic precipitators
[DOE/EV-10506/T1] N81-23395

ELECTROSTATICS
On the structures and mapping of auroral electrostatic potentials
[NASA-CR-164336] N81-23741

ELEVATION ANGLE
Propagation effects in high latitudes --- Intelsat and Symphonie transmissions N81-23132

EMBRITTLEMENT
Embrittlement of high-strength steels: Effects of impurities and hydrogen N81-23236

EMISSION SPECTRA
The emission of electrons and positive ions from fracture of materials
[AD-A097390] N81-23194
Coherent transient effect studies of Rydberg atoms
[AD-A097588] N81-23207
Dynamics of the dayside cusp aurora N81-23533
Radio Astronomy N81-23998

EMISSIVITY
Synchrotron emissivity from mildly relativistic particles
[NASA-CR-164335] N81-23868

EMULSIONS
Physical and chemical studies of chlorophyll in microemulsions
[DOE/ER-04452/3] N81-23788

ENAMELS
The effect of cooling rate on the apparent bond strength of porcelain-metal couples
[AD-A097492] N81-23279

ENCAPSULATED MICROCIRCUITS
Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619

ENCAPSULATING
The strontium heat source development program
[PNL-1845-48] N81-23503

ENERGY ABSORPTION
Physical and chemical studies of chlorophyll in microemulsions
[DOE/ER-04452/3] N81-23788

ENERGY ABSORPTION FILMS
Thin films of InP for photovoltaic energy conversion
[COO-3004-4] N81-23632

ENERGY CONSERVATION
An investigation of drag reduction for a standard truck with various modifications
[NASA-CR-163107] N81-23040
User acceptance of an energy efficient office building, a study of the Norris Cotton Federal Office Building
[PB81-147365] N81-23335
Models for residential-and commercial-sector energy conservation analysis: Applications, limitations, and future potential
[DOE/PE-70044/T3] N81-23639
Residential energy use and conservation actions: Analysis of disaggregate household data
[ORNL/CON-68] N81-23686
Learning to look ahead: The need for a national materials policy and planning process
[EMD-79-30] N81-23974
Computer simulated building energy consumption for verification of energy conservation measures in network facilities N81-24017
Reporting Capabilities and Management of the DSN Energy Data Base N81-24018

ENERGY CONSUMPTION
Global energy consumption and production in 2000
[ORAU/IEA-81-2(M)] N81-23642
International energy indicators
[DOE/IA-0010/8] N81-23655
Residential energy use and conservation actions: Analysis of disaggregate household data
[ORNL/CON-68] N81-23686
Regional comparisons of on-site solar potential in the residential and industrial sectors
[LBL-11789] N81-23695
Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722

National Energy Information System basic concepts
[DOE/EIA-0229] N81-23951
Propane conversion in the vehicle fleet at the Idaho National Engineering Laboratory
[EGG-TRANS-5291] N81-23977
Computer simulated building energy consumption for verification of energy conservation measures in network facilities N81-24017

ENERGY CONVERSION
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262
Optimum design of untethered wave energy generation systems N81-23403
High temperature solar receiver
[NASA-CR-164332] N81-23614
Analyses of mixed-hydrocarbon binary thermodynamic cycles for moderate-temperature geothermal resources
[EGG-PG-G-80-041] N81-23644
Advanced system demonstration for utilization of biomass as an energy source
[DOE/ET-20055/T5] N81-23679
Molten carbonate fuel cell large stack development
[PB81-145930] N81-23708

ENERGY CONVERSION EFFICIENCY
Development of photoelectrochemical cells based on compound semiconductors and nonaqueous electrolytes
[SERI/PR-8002-7-T1] N81-23214
Electric utility value determination for wind energy. Volume 2: A user's guide
[SERI/TR-732-604-VOL-2] N81-23394
Materials for high efficiency monolithic multigap concentrator solar cells
[SERI/TR-8081-1-T3] N81-23646
Fuel cell power plant integrated systems evaluation
[EPRI-EM-1670] N81-23694

ENERGY DISSIPATION
Some topics in applied electrochemical kinetics
[AD-A097405] N81-23206
Experimental investigations of certain side reactions and the initial voltage transient for FeS2 cathodes in thermal batteries
[SAND-80-2341] N81-23399

ENERGY POLICY
Metallic species derived from fluidized bed coal combustion
[DOE/MC-08196/T1] N81-23257
Refining and upgrading of synfuels from coal and oilshales by advanced catalytic processes
[FE-2315-58] N81-23311
Ethanol production in northern New York: Technical and economic feasibility
[PB81-144438] N81-23322
Processing equipment for resource recovery systems. Volume 2: Magnetic separators, air classifier and ambient air emissions tests
[PB81-141590] N81-23324
Construction procedures using self hardening fly ash
[PB81-153884] N81-23334
Next steps in two-phase flow: Executive summary
[DOE/ET-27225/12] N81-23429
Illinois biomass resources. Annual crops and residues; canning and food-processing wastes, preliminary assessment
[ANL/EMR-6] N81-23573
Advanced system demonstration for utilization of biomass as an energy source, executive summary
[DOE/ET-20055/T3-EXEC-SUMM] N81-23596
MOD-OA 200 kW wind turbine generator engineeringing
[NASA-CR-165129] N81-23598
Solar energy system economic evaluation for Wormser Columbia, South Carolina
[NASA-CR-161722] N81-23605
Solar heating and hot water system installed at Charlotte Memorial Hospital, Charlotte, North Carolina
[NASA-CR-161731] N81-23606
Solar energy system economic evaluation for Colt Pueblo, Pueblo, Colorado
[NASA-CR-161725] N81-23607
Assessment of disk MHD generators for a base load powerplant
[NASA-TM-82609] N81-23611
The United States Air Force Academy solar energy research project: Solar test house
[AD-A097212] N81-23628
Wind energy resource atlas. Volume 9: The Southwest region --- Nevada and California
[PNL-3195WERA-9-VOL-9] N81-23634
Models for residential-and commercial-sector energy conservation analysis: Applications, limitations, and future potential
[DOE/PE-70044/T3] N81-23639
Global energy consumption and production in 2000
[ORAU/IEA-81-2(M)] N81-23642
Large wind turbine generator performance assessment
[EPRI-AP-1641] N81-23645
Development of a lead-acid battery with high energy and power density
[BMFT-FB-T-80-151] N81-23653
Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664
Advanced system demonstration for utilization of biomass as an energy source. Volume 4: Design drawings
[DOE/ET-20055/T2-VOL-4] N81-23667
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678
Rockwell-Rocketdyne flywhell test results
[Y/DX-244] N81-23697
Review of the geothermal reservoir well stimulation program
[LA-UR-81-26] N81-23701
Solar enhanced oil recovery: A potential early market for industrial solar energy
[SAND-80-1869C] N81-23702
Hot-gas desulfurization. 1: Use of gasifier ash in a fixed-bed process
[DOE/ET-10463/T1-VOL-1] N81-23716
Long-term measurements of ground motions offshore
[SAND-80-2718C] N81-23756

ENERGY REQUIREMENTS
System integration issues of residential solar photovoltaic systems
[DOE/RA-29349/01] N81-23643
Short-term energy outlook. Volume 2: Methodology
[DOE/EIA-0202/4-VOL-2] N81-23654
National Energy Information System basic concepts
[DOE/EIA-0229] N81-23951
Introduction of electric vehicles into the utility system: Analysis of research needs
[EPRI-EM-1716] N81-23978

ENERGY SPECTRA
Synchrotron emissivity from mildly relativistic particles
[NASA-CR-164335] N81-23868

ENERGY STORAGE
Preliminary assessment of the impact of flywheel energy storage technology on taxicab fleet operation in a large metropolitan city
[LA-8722-MS] N81-23685
Rockwell-Rocketdyne flywhell test results
[Y/DX-244] N81-23697

ENERGY TECHNOLOGY
Development of analytical reference materials for refuse-derived fuels
[PB81-135030] N81-23323
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
Photovoltaics Program Utility Interface Southwest Regional Workshop Proceedings
[NASA-CR-164284] N81-23601
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Comparing energy technology alternatives from an environmental perspective
[DOE/EV-0109] N81-23688
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692

ENGINE FAILURE
Engine parameter trend analysis with LEADS 200: Possibilities and limitations --- using flight recorder data N81-23010
Investigations into local fault detection on turbojet engines --- monitoring instruments N81-23011
Location of faults in jet engines by calculation of component characteristics N81-23012

ENGINE INLETS
Electromagnetic scattering by open circular waveguides --- engine inlets N81-23339

ENGINE MONITORING INSTRUMENTS
Engine parameter trend analysis with LEADS 200: Possibilities and limitations --- using flight recorder data N81-23010
Investigations into local fault detection on turbojet engines --- monitoring instruments N81-23011
The engine usage monitoring system: An heuristic approach to cost effective data monitoring and analysis --- onboard fatigue monitoring N81-23013
Classification of operating conditions of turbomachines from solid borne sound N81-23015
Reduction of measured data and possibilities for early detection of sensor break-down N81-23016

ENGINE NOISE
Lateral attenuation of high-by-pass ratio engined aircraft noise
[NASA-TM-81968] N81-23862

ENGINE PARTS
The rejuvenation of properties in turbine engine hot section components by hot isostatic pressing
[AD-A097551] N81-23088
Traction drive for cryogenic boost pump --- hydrogen oxygen rocket engines
[NASA-TM-81704] N81-23188

ENGINE TESTS
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161748] N81-23186

ENGINEERING DRAWINGS
MOD-OA 200 kW wind turbine generator engineeringing
[NASA-CR-165129] N81-23598

ENTROPY (STATISTICS)
Note on computer graphics for maximum entropy spectral analysis
[AD-A097121] N81-23822

ENUMERATION
Binary integer linear programming: A hybrid implicit enumeration approach
[AD-A097108] N81-23817

ENVIRONMENT EFFECTS
Penetration of solar radiation in snow-ice covered water reservoirs: Winterkill
[PB81-149643] N81-23584
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586
Advanced system demonstration for utilization of biomass as an energy source, executive summary
[DOE/ET-20055/T3-EXEC-SUMM] N81-23596
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668
Comparing energy technology alternatives from an environmental perspective
[DOE/EV-0109] N81-23688

Environmental issues and site selection criteria for small hydropower projects in developing countries
[ORNL/TM-7620] N81-23720

Geothermal energy geopressure subprogram
[DOE/EA-0134] N81-23721

Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722

Exploratory benefit-cost analysis of environmental controls on hydrothermal energy
[PNL-3527] N81-23725

ENVIRONMENT PROTECTION

Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554

Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555

Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556

Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557

Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558

Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559

Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560

Federal-State environmental programs: The State perspective
[CED-80-106] N81-23711

ENVIRONMENTAL MONITORING

Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550

Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585

Assessing the representativeness of ozone monitoring data
[PB81-146995] N81-23730

Four corners air monitoring
[PB81-144156] N81-23733

Report of the NASA working group on tropospheric program planning
[NASA-RP-1062] N81-23742

ENVIRONMENTAL QUALITY

Environmental quality research fish and aufwuchs bioassay
[AD-A097080] N81-23714

ENVIRONMENTAL TESTS

Materials for high-temperature hydrogen fluorine environments
[AD-A097426] N81-23190

Environmental effects on fatigue behavior of metals
[AD-A097546] N81-23248

Localized corrosion in materials for geothermal power --- using brines with and without saturated hydrogen sulfide
[DOE/ET-28317/T1] N81-23256

ENZYME ACTIVITY

Kinetic studies of heterogeneous biocatalysis using the rotating ring-disk enzyme electrode N81-23199

Bioelectrocatalysis using chemically modified electrodes N81-23204

EPITAXY

Low-energy electron diffraction study of the surface-defect structure Ge grown epitaxially on GaAs(110)
[AD-A097599] N81-23927

Model systems for the epitaxial growth and capping of GaAs
[AD-A097410] N81-23928

EPOXY RESINS

Diffusion mechanisms and degradation of environmentally sensitive composite materials
[COO-444-9] N81-23196

EQUATIONS OF MOTION

A numerical treatment of the dynamic motion of a zero bending rigidity cylinder in a viscous stream
[AD-A097450] N81-23426

The Shock and Vibration Digest, volume 13, no. 4
[AD-A097950] N81-23483

Response of nonlinear mechanical systems to random excitation. Part 1: Markov methods N81-23485

Extended rate equations
[UCID-18932] N81-23879

Limiting beta of stellarators with no net current
[PPPL-1738] N81-23913

EQUATORIAL ATMOSPHERE

Plasma instabilities in the electrojets N81-23532

EQUIPMENT SPECIFICATIONS

Advanced systems demonstration for utilization of biomass as an energy source. Volume 3: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-1] N81-23665

Advanced systems demonstration for utilization of biomass as an energy source. Volume 3, book 2: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-2] N81-23666

Block 5 solar cell module: Design and test specification for intermediate-load applications, 1981
[DOE/CS-31037/T1] N81-23693

EROSION

Assessment of gas turbine erosion. Volume 2: Erosion analysis and test planning
[PB81-139677] N81-23091

Synergistic erosion/corrosion of superalloys in PFB coal combustor effluent
[NASA-TM-81715] N81-23245

Contributions to a thermodynamic model of Earth systems on rivers
[NASA-CR-164272] N81-23506

ERROR ANALYSIS

Analysis of brief duration losses and error structures in satellite links N81-23125

Clock synchronization experiment via Symphonie satellite N81-23135

An analysis of source structure effects in radio interferometry measurements
[NASA-CR-164285] N81-23344

On sensitivity analysis in systems for planning and decision support
[AD-A097409] N81-23940

ERROR CORRECTING CODES

A decoding failure test for the transform decoder of Reed-Solomon code N81-24014

ERROR DETECTION CODES

Poster error probability in the Mu-11 Sequential Ranging System N81-24001

A decoding failure test for the transform decoder of Reed-Solomon code N81-24014

ERRORS

Ultimate limits to error probabilities for ionospheric models based on solar geophysical indices and how these compare with the state of the art N81-23538

ESTIMATES

Investigation of some multiple input/output frequency response function experimental modal analysis techniques N81-23481

ESTIMATING

Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

A Monte Carlo study of AR(1) estimators under several performance criteria
[AD-A097533] N81-23853

A comparison of the ANCILLES and LOGIST parameter estimation procedures for the three-parameter logistic model using goodness of fit as a criterion
[AD-A097081] N81-23858

ESTUARIES

Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560

ETCHING

Model systems for the epitaxial growth and capping of GaAs
[AD-A097410] N81-23928

ETHYL ALCOHOL

Ethanol production in northern New York: Technical and economic feasibility
[PB81-144438] N81-23322

EUROPE

Airborne measurement of aerosol size distributions over northern Europe. Volume 1: Spring and fall 1976, summer 1977
[AD-A097090] N81-23750

A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759

Euronet and its interlinking to other networks N81-23958

EUROPEAN SPACE PROGRAMS

The French German broadcasting satellite program N81-23170

EUTROPHICATION

Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585

EVALUATION

The experimental use of the Symphonie satellite during the 19th session of the General Conference - UNESCO --- teleconferences N81-23157

EVAPOTRANSPIRATION

Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543

EXCITATION

Research in laser processes
[AD-A097563] N81-23449

First results from the Tromsoe ionospheric modification facility N81-23521

EXHAUST EMISSION

Testing of new technology: Three-way catalyst equipped vehicles in Los Angeles
[PB81-138075] N81-23474

Four corners air monitoring
[PB81-144156] N81-23733

EXHAUST GASES

Test and evaluation of methanol in a gas turbine system
[EPRI-AP-1712] N81-23307

An integrated exhaust gas analysis system with self-contained data processing and automatic calibration
[NASA-TM-81592] N81-23435

Initial validation of an ambient air quality model for Naval air operations
[AD-A097665] N81-23715

Diesel-exhaust emissions-toxicology program
[LMF-81] N81-23719

EXISTENCE THEOREMS

Existence and uniqueness of solutions to a class of nonlinear-operator-differential equations arising in automated spaceship navigation
[NASA-TP-1860] N81-23182

EXPEDITIONS

Design and implementation of a small terminal for the Everest 78 expedition --- Symphonie Himalsat experiment N81-23122

EXPERIMENTAL DESIGN

Computer networking experiment via the Symphonie satellite N81-23131

Preliminary study of head-up assessment techniques. 1: Viewing duration of instrument panel and HUD symbology using a recall methodology
[NASA-TM-78517] N81-23798

EXPLOSIVE FORMING

Radioisotope space power generator
[GA-A-15683] N81-23638

EXPLOSIVES

TNT equivalency of bulk nitrocellulose
[AD-A097472] N81-23303

Hot spot initiation patterns in shocked explosives and propellants recorded by thermal film
[AD-A097088] N81-23305

EXTINCTION
Solar extinction radiometry
[NASA-CR-164290] N81-23993
EXTRAPOLATION
MEGA16 - Computer program for analysis and extrapolation of stress-rupture data
[NASA-TP-1809] N81-23486
EXTRATERRESTRIAL RESOURCES
The utilization of nonterrestrial materials --- resources for solar power satellite construction
[NASA-TM-83106] N81-23099
EXTREMELY HIGH FREQUENCIES
Market capture by 30/20 GHz satellite systems. Volume 1: Executive summary
[NASA-CR-165231] N81-23345
Market capture by 30/20 GHz satellite systems, volume 2
[NASA-CR-165232] N81-23346
EXTREMELY LOW FREQUENCIES
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754
EXTREMUM VALUES
An algorithm for the rapid location of an extreme of a function subject only to geometric restrictions
[NASA-CR-160940] N81-23812

F

F REGION
Thermospheric neutral composition changes and their causes N81-23524
DNA/PLACES, barium event JAN: Quick-look field report of 'in situ' probe measurements
[AD-A097227] N81-23751
F 2 REGION
Ionospheric composition: The seasonal anomaly explained N81-23523
F-16 AIRCRAFT
F-16 integrated logistics support: Still time to consider economical alternatives
[PB81-137473] N81-23079
FABRICATION
A high voltage linear compatible Integrated Injection Logic (IIL) structure: Process design and specifications N81-23376
Demonstration of Pulsed Electron Beam Applications (PEBA) for fabricating small geometry semiconductor devices
[AD-A097547] N81-23382
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652
Development of polycrystal GaAs solar cells
[SERI/PR-8032-1-T1] N81-23660
Electrochemical photovoltaic cells CdSe thin film electrodes
[SERI/TR-8002-8-T1] N81-23676
High precision fiber development
[AD-A097444] N81-23891
FAILURE ANALYSIS
Investigations into local fault detection on turbojet engines --- monitoring instruments N81-23011
Location of faults in jet engines by calculation of component characteristics N81-23012
Reduction of measured data and possibilities for early detection of sensor break-down N81-23016
Microstructural changes following superplastic deformation of commercially pure titanium
[AD-A097277] N81-23247
MEGA16 - Computer program for analysis and extrapolation of stress-rupture data
[NASA-TP-1809] N81-23486
Extension of oblique incidence method to photo-orthotropic-elasticity
[NASA-CR-164334] N81-23492
FAR INFRARED RADIATION
Attenuation and coupling of far infrared surface plasmons N81-23888
FARM CROPS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
FARMLANDS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
FAST NUCLEAR REACTORS
Integral tests of fast neutron dosimetry cross sections
[EPRI-NP-1658] N81-23876
FATIGUE (MATERIALS)
The engine usage monitoring system: An heuristic approach to cost effective data monitoring and analysis --- onboard fatigue monitoring N81-23013
Fatigue degradation in compressively loaded composite laminates --- graphite-epoxy composites
[NASA-CR-165681] N81-23192
High temperature low cycle fatigue data for three high strength nickel-base superalloys
[AD-A097430] N81-23246
Environmental effects on fatigue behavior of metals
[AD-A097546] N81-23248
Coarsely random cracking in one-crack fatigue models
[AD-A097194] N81-23498
FATIGUE LIFE
Fatigue life variability in aluminum alloy aircraft structures
[AD-A097198] N81-23249
Prolonging thermal barrier coated specimen life by thermal cycle management
[NASA-TM-81742] N81-23417
Assessment of variations in thermal cycle life data of thermal barrier coated rods
[NASA-TM-81743] N81-23418
Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters
[AD-A097283] N81-23438
A single-expression formula for inverting strain-life and stress-strain relationships
[NASA-CR-165347] N81-23491
FATIGUE TESTS
The fracture morphology of nickel-base superalloys tested in fatigue and creep-fatigue at 650 C
[NASA-TM-81740] N81-23244
NASA five-ball fatigue tester: Over 20 years of research
[NASA-TM-82589] N81-23462
Analysis of results from an International Fatigue Test Programme
[AD-A097200] N81-23493
FAULT TOLERANCE
Comparative analysis of techniques for evaluating the effectiveness of aircraft computing systems
[NASA-CR-159358] N81-23477
FAULT TREES
Comparative analysis of techniques for evaluating the effectiveness of aircraft computing systems
[NASA-CR-159358] N81-23477
On sensitivity analysis in systems for planning and decision support
[AD-A097409] N81-23940
Multiple objective evaluation and choicemaking under risk with partial preference infomation
[AD-A097418] N81-23941
FEASIBILITY ANALYSIS
Industrial application of C-Es coal-gasification process
[FE-1545-86] N81-23308
Feasibility study of satellite-borne lidar global wind monitoring system, part 2
[PB81-145369] N81-23781
FEDERAL BUDGETS
Authorizing appropriations to the National Aeronautics and Space Administration for fiscal year 1982
[H-REPT-97-32] N81-23972
National Aeronautics and Space Administration Authorization Act, 1982
[S-REPT-97-100] N81-23973
FEEDBACK CONTROL
ACOSS six (Active Control Of Space Structures)
[AD-A097206] N81-23183
Properties of multivariable root loci
[NASA-CR-164319] N81-23829
FERROELECTRICITY
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437
FIBER OPTICS
GRIDNET
[PB81-144370] N81-23372
Advanced wavefront sensor concepts
[AD-A097187] N81-23391
High precision fiber development
[AD-A097444] N81-23891
Wavelength division multiplexing: Overview of the state of the art
[AD-A097587] N81-23896
A four-way distribution amplifier for reference signal distribution N81-24003
FIBER REINFORCED COMPOSITES
Structural design of BFRP patches for Mirage wing repair
[AD-A097195] N81-23024
Extension of oblique incidence method to photo-orthotropic-elasticity
[NASA-CR-164334] N81-23492
FIELD COILS
Wave-driver options for low-aspect-ratio steady-state Tokamak reactors
[ANL/FPP/TM-141] N81-23915
FIELD EFFECT TRANSISTORS
Methods and formulas for determining the integral nonlinearity of solid-state amplifiers N81-23379
A study of flicker noise in MOSFETS
[AD-A097557] N81-23389
FIGHTER AIRCRAFT
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 1: Study overview --- aerodynamic characteristics
[NASA-CR-152391-VOL-1] N81-23030
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 2: Evaluation of prediction methodologies
[NASA-CR-152391-VOL-2] N81-23031
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 3: Effects of configuration variations from baseline
[NASA-CR-152391-VOL-3] N81-23032
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 4: RALS R104 aerodynamic characteristics and comparisons with E205 configuration aerodynamic characteristics
[NASA-CR-152391-VOL-4] N81-23033
Transonic flutter and gust-response tests and analyses of a wind-tunnel model of a torsion free wing airplane
[NASA-TM-81961] N81-23072
FILE MAINTENANCE (COMPUTERS)
Library records: In-house file creation versus external services N81-23964
Reporting Capabilities and Management of the DSN Energy Data Base N81-24018
FINES
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T2] N81-23460
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T3] N81-23468
FINITE ELEMENT METHOD
The finite element method for sheet metal structures - development of a computer program
[PB81-135725] N81-23330
Finite elements for fluid dynamics
[AD-A097215] N81-23424
Large and small deformation finite element analysis of rolling contact N81-23482
Some thoughts on material stability
[AD-A097350] N81-23499
Some stability conditions for a compressible elastic material
[AD-A097351] N81-23500

FIRE CONTROL
Advanced target tracker concepts
[AD-A097358] N81-23890
FIRE FIGHTING
Controlled burnout of wasted coal on abandoned coal mine lands
[PB81-148231] N81-23234
FIRE PREVENTION
Study to develop improved fire resistant aircraft passenger seat materials
[NASA-CR-152408] N81-23058
FISHES
Environmental quality research fish and aufwuchs bioassay
[AD-A097080] N81-23714
FISSION
Dissipation and diffusion in nuclear fission
[LA-UR-81-301] N81-23883
FITTING
On the degree of inflation of measures of fit induced by empirical model building
[AD-A097536] N81-23856
FLAME PROPAGATION
The theory of flammability limits. Conductive-convective wall losses and thermal quenching
[PB81-150047] N81-23233
FLAME SPECTROSCOPY
Multielement analysis studies by flame and inductively coupled plasma spectroscopy utilizing computer-controlled instrumentation
[PB81-149528] N81-23231
FLAMMABILITY
The theory of flammability limits. Conductive-convective wall losses and thermal quenching
[PB81-150047] N81-23233
FLAT PLATES
A study of real jet effects on the surface pressure distribution induced by a jet in a crossflow
[NASA-CR-166150] N81-23029
A Module Experimental Process System Development Unit (MEPSDU) --- development of low cost solar arrays
[NASA-CR-164325] N81-23616
Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617
Solar energy systems: Standards for cover plates for flat plate solar collectors
[PB81-147290] N81-23709
FLIGHT CONDITIONS
Evaluation of the Transcribed Weather Broadcast (TWEB) system and alternatives. Volume 2: Cost analyses of the TWEB radio and telephone accessible mass weather dissemination services
[AD-A097567] N81-23769
FLIGHT CONTROL
ACOSS six (Active Control Of Space Structures)
[AD-A097206] N81-23183
FLIGHT PATHS
The reconstruction of flight paths from AIDS data with the aid of modern filtering methods --- kalman filters N81-23021
FLIGHT RECORDERS
Contributions to the 9th Symposium on aircraft integrated data systems --- Conferences
[ESA-TT-532] N81-23008
Experiences with a Flight Data Recording System (FDRS) in a German Airforce fighter bomber wing after field trials --- digital equipment N81-23009
Engine parameter trend analysis with LEADS 200: Possibilities and limitations --- using flight recorder data N81-23010
The engine usage monitoring system: An heuristic approach to cost effective data monitoring and analysis --- onboard fatigue monitoring N81-23013
Description of the British Civil Aviation Airworthiness Data Recording Programme (CAADRP) --- analysis of flight recorder data N81-23017
The SYDAS flight data processing system N81-23018
The use of aircraft integrated data system at KLM --- performance monitoring N81-23019
Detection and location of faults in onboard aircraft systems with the aid of the Automatic Fault Identification System (AFIS) N81-23022
Processing of AIDS flight recorder data for a quick look with the aid of a hybrid computer system N81-23023
FLIGHT SAFETY
Study to develop improved fire resistant aircraft passenger seat materials
[NASA-CR-152408] N81-23058
FLIGHT SIMULATION
Performance deterioration based on simulated aerodynamic loads test, JT9D jet engine diagnostics program
[NASA-CR-165297] N81-23086
User's manual for flight Simulator Display System (FSDS)
[NASA-CR-164295] N81-23095
Effects of criteria on flight simulation. Study 2: Multiple criteria
[AD-A097526] N81-23794
FLIGHT SIMULATORS
A nonlinear propulsion system simulation tehnique for piloted simulators
[NASA-TM-82600] N81-23085
Microprocessor generated vertical gyrohorizon instrument for the Blue Bird simulator
[AD-A097658] N81-23098
Refinements and validation testing of Human Operator Performance Emulator (HOPE)
[AD-A097449] N81-23793
Instructor/operator display evaluation methods
[AD-A097208] N81-23802
Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818
FLIGHT STABILITY TESTS
Analytical testing
[NASA-CR-3429] N81-23487
FLIGHT TESTS
Groundspeed/airspeed differences as a wind shear indicator and flight evaluation of a DME-derived system to determine groundspeed
[AD-A097566] N81-23768
FLIGHT TRAINING
Refinements and validation testing of Human Operator Performance Emulator (HOPE)
[AD-A097449] N81-23793
Effects of criteria on flight simulation. Study 2: Multiple criteria
[AD-A097526] N81-23794
FLOOD CONTROL
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586
FLOOD PREDICTIONS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
FLOODS
Development of a model for estimating the extent of river flooding with satellite and in situ data
[PB81-152035] N81-23588
FLORIDA
Low-level convergence and the prediction of convective precipitation in south Florida
[AD-A097553] N81-23777
FLOW CHARACTERISTICS
Some remarks on the unsteady airloads on oscillating control surfaces in subsonic flow N81-23055
Rheology, flow and atomization of coal-oil mixtures N81-23404
FLOW CHARTS
Computer simulated building energy consumption for verification of energy conservation measures in network facilities N81-24017
FLOW COEFFICIENTS
Methods for calculating unsteady turbulent boundary layers N81-23048
FLOW DISTRIBUTION
Investigation of the interaction of lift jets and a ground plane --- wall jet radial momentum flux from rectangular nozzles
[NASA-CR-152343] N81-23026
Oscillating supercritical airfoils in the transonic regime with viscous interactions N81-23047
Multinozzle plume flowfields
[AD-A097244] N81-23419
Turbulent flow and heat transfer in passage around 180 degree bend: An experimental and numerical study
[AD-A097461] N81-23421
Application of holography to the study of helicopter rotor flow fields
[NASA-CR-164293] N81-23433
FLOW GEOMETRY
Investigation of the interaction of lift jets and a ground plane --- wall jet radial momentum flux from rectangular nozzles
[NASA-CR-152343] N81-23026
A study of real jet effects on the surface pressure distribution induced by a jet in a crossflow
[NASA-CR-166150] N81-23029
FLOW MEASUREMENT
Trailing edge wake flow characteristics of upper surface blown configurations --- noise generators
[NASA-CR-152224] N81-23028
FLOW RESISTANCE
An investigation of drag reduction for a standard truck with various modifications
[NASA-CR-163107] N81-23040
FLOW STABILITY
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056
FLOW VELOCITY
Fundamental research in turbulent modeling. Part 1: Theory. Part 2: Experiment
[AD-A097431] N81-23425
FLOW VISUALIZATION
Investigation of the use of liquid crystal thermography to study flow over turbomachinery blades
[AD-A097289] N81-23089
A theoretical study of turbulence in terms of conditioned variables --- flow visualization N81-23405
FLUENCE
Performance of high resistivity n+pp+ silicon solar cells under 1 MeV electron irradiation
[NASA-TM-82610] N81-23626
FLUID DYNAMICS
Fluid forces on smooth and rough circular cylinders N81-23402
The boundary layer on compressor cascade blades
[NASA-CR-164330] N81-23416
FLUID FILMS
Lubrication fundamentals
[NASA-TM-81762] N81-23490
FLUID FILTERS
Symposium on the transfer and utilization of particulate control technology. Volume 3: Particulate control devices
[PB81-144800] N81-23734
FLUID FLOW
Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226
Investigation of numerical modeling techniques for recirculations flows: Parts 1 and 2
[EPRI-CS-1665-PT-1] N81-23427
A note on sound radiation into a uniformly flowing fluid
[NASA-CR-166177] N81-23861
FLUID JETS
Research on the hylife liquid first wall concept for future laser fusion reactors
[UCRL-15314] N81-23919
FLUIDIZED BED PROCESSORS
Assessment of gas turbine erosion. Volume 1: Assessment of available erosion data
[PB81-139685] N81-23092
Synergistic erosion/corrosion of superalloys in PFB coal combustor effluent
[NASA-TM-81715] N81-23245
Metallic species derived from fluidized bed coal combustion
[DOE/MC-08196/T1] N81-23257
Coal gasification pilot plant support studies
[FE-2806-7] N81-23315
Experimental studies of partially defluidized bed with immersed heat exchange tubes N81-23407
Fluidization using non-equilibrium thermodynamics
[PB81-153249] N81-23707
Fluidized-bed combustion emissions: Toxicology program
[LMF-83] N81-23718
FLUORESCENCE
Quantitative absorption and fluorescence studies of NO between 1060 and 2000 A
[NASA-CR-164340] N81-23867

Fluorescent scattering by molecules embedded in small particles
[DOE/EV-04361/T2] N81-23869

FLUOROCARBONS

Economic implications of regulating nonaerosol chlorofluorocarbon emission: An executive briefing
[PB81-146698] N81-23735

Flexible urethane foams and chlorofluorocarbon emissions: A support document for economic implications of regulating chlorofluorocarbon emissions from nonaerosol applications
[PB81-146706] N81-23736

FLUTTER ANALYSIS

Unsteady transonic flow past airfoils in rigid body motion --- predicting aerodynamic forces for flutter analysis
[AD-A097142] N81-23041

Transonic flutter study of a wind-tunnel model of an arrow-wing supersonic transport --- SCAT-15F model test in the Langley Transonic Dynamics Tunnel
[NASA-TM-81962] N81-23071

FLUX DENSITY

Development of a lead-acid battery with high energy and power density
[BMFT-FB-T-80-151] N81-23653

FLUX PINNING

Theory of flux-flow voltage noise in type II superconductors
[IS-T-935] N81-23398

FLY BY WIRE CONTROL

Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies
[NASA-CR-152336-1] N81-23064

Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065

FLYWHEELS

Preliminary assessment of the impact of flywheel energy storage technology on taxicab fleet operation in a large metropolitan city
[LA-8722-MS] N81-23685

Rockwell-Rocketdyne flywheel test results
[Y/DX-244] N81-23697

FOCUSING

Effects of surface-mapping corrections and synthetic-aperture focusing techniques on ultrasonic imaging
[EGG-FM-5314] N81-23865

FOG

Air mass considerations in fog optical modeling
[AD-A097609] N81-23772

An investigation of marine fog forecast concepts
[AD-A097338] N81-23778

FOOD PROCESSING

Evaluation of engineered foods for Closed Ecological Life Support System (CELSS)
[NASA-CR-160952] N81-23800

FORCED VIBRATION

On certain integrals which pertain to the forced vibration of plates
[NASA-CR-166175] N81-23488

FORECASTING

Some considerations upon models for ionospheric radio communications forecasting N81-23541

Global energy consumption and production in 2000
[ORAU/IEA-81-2(M)] N81-23642

Short-term energy outlook. Volume 2: Methodology
[DOE/EIA-0202/4-VOL-2] N81-23654

An assessment of Markov renewal models in forecasting international affairs
[AD-A097295] N81-23839

A Monte Carlo study of AR(1) estimators under several performance criteria
[AD-A097533] N81-23853

FOREST MANAGEMENT

Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

FORESTS

Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542

An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545

Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

FORMALISM

Evaluating a data abstraction testing system based on formal specifications
[AD-A097231] N81-23809

FORMING TECHNIQUES

Machining with a round-nosed form tool N81-23457

Shape-casting titanium in olivine, garnet, chromite, and zircon rammed and shell molds
[PB81-147274] N81-23475

FOSSIL FUELS

Analysis of the market and product costs for coal-derived high Btu gas: Staff working paper
[DOE/FE-0011] N81-23319

US Department of Energy environmental compliance program handbook: Federal regulations on air quality, fossile energy
[ORNL/EIS-176] N81-23727

FOULING

Combustion system processes leading to corrosive deposits
[NASA-TM-81752] N81-23243

Slime Analysis of painted steel panels immersed in Biscayne Bay, Miami Beach, Florida
[AD-A097229] N81-23280

FRACTURE MECHANICS

The emission of electrons and positive ions from fracture of materials
[AD-A097390] N81-23194

Composite materials for structural design --- polymer matrix composite materials
[AD-A097297] N81-23195

The relationship between deformation and fracture in two phase elasto-plastic equiaxed alloys N81-23241

Impacted notch bend specimen --- aluminum alloys
[AD-A097131] N81-23495

Linear-elastic and elastic plastic fracture mechanics of structural materials --- J integral method
[ESA-TT-649] N81-23505

FRACTURE STRENGTH

The fracture morphology of nickel-base superalloys tested in fatigue and creep-fatigue at 650 C
[NASA-TM-81740] N81-23244

Physical and mechanical properties of cast 17-4 PH stainless steel
[SAND-80-2302] N81-23260

Threshold tenr strength of some molecular networks --- high temperatures and polymers
[AD-A097232] N81-23283

STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469

FRACTURES (MATERIALS)

The emission of electrons and positive ions from fracture of materials
[AD-A097390] N81-23194

Microstructural effects on the mechanical properties and thermal shock resistance of a high alumina refractory concrete N81-23479

FRANCE

The Symphonie program: Objectives, operations and technical operations of the project N81-23103

ARIANE: Building data bank N81-23961

FREE CONVECTION

Superrotation planetary atmospheres: Mechanical analogy, angular momentum budget and simulation of the spin up process
[NASA-TM-82137] N81-23987

FREE FLOW

Calculation of two-dimensional inlet flow fields by an implicit method including viscous effects: User's manual
[NASA-CR-3412] N81-23027

FREE VIBRATION

Vibration of curved beams N81-23484

FREEZING

Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543

FRENCH SATELLITES

The French satellite telecommunications program: Telecom 1 N81-23167

FRENCH SPACE PROGRAMS

The French satellite telecommunications program: Telecom 1 N81-23167

FREQUENCIES

Investigation of some multiple input/output frequency response function experimental modal analysis techniques N81-23481

FREQUENCY ASSIGNMENT

Efficient spectrum utilization in mobile radio communication systems N81-23338

FREQUENCY CONVERTERS

The 15kW General Purpose Power Conditioner (frequency changer), inverter/ converter integration
[AD-A097165] N81-23380

FREQUENCY DIVISION MULTIPLE ACCESS

Digital communication multiple access scheme --- using Symphonie N81-23116

The Celtic system: An experiment with Symphonie N81-23117

FREQUENCY MODULATION

Single Channel Per Carrier (SCPC)-FM system N81-23120

FREQUENCY RESPONSE

Calculating building heating and cooling loads using the frequency response of multilayered slabs
[AD-A097597] N81-23326

FREQUENCY STABILITY

Carrier frequency stability and its effect on phase shift keying signals in the satellite channel --- Symphonie satellite N81-23123

Station stability measurement N81-24004

The reliability of multistate, multioutput systems N81-24011

FREQUENCY STANDARDS

Symphonie experience and selection of broadcasting standards for direct broadcasting satellite systems N81-23171

A frequency and timing subsystem for the ORION mobile unit N81-23999

Frequency standard test facility data acquisition and processing system N81-24002

FRICTION

National runway friction measurement program
[AD-A097334] N81-23097

FUEL CAPSULES

Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905

FUEL CELLS

Evaluation of distributed gas cooling of pressurized PAFC for utility power generation
[NASA-CR-165303] N81-23600

Molten carbonate fuel cell system verification and scale-up
[EPRI-EM-1481] N81-23651

Fuel cell power plant integrated systems evaluation
[EPRI-EM-1670] N81-23694

Molten carbonate fuel cell large stack development
[PB81-145930] N81-23708

Advanced electric vehicle
[UCRL-53089] N81-23981

FUEL COMBUSTION

Pulverized fuel combustion: Modeling and scaleup mathodologies
[DOE/PC-30294/1] N81-23219

Experimental evaluation of catalytic combustion with heat removal at near stoichiometric conditions
[NASA-TM-81748] N81-23609

FUEL CONSUMPTION

Potential impacts of Brayton and Stirling cycle engines
[NASA-CR-164278] N81-23603

FUEL CONTAMINATION

Microbial deterioration of marine diesel fuel from oil shale
[AD-A097674] N81-23304

FUEL OILS

Rheology, flow and atomization of coal-oil mixtures N81-23404

Short-term energy outlook. Volume 2: Methodology
[DOE/EIA-0202/4-VOL-2] N81-23654

FUEL PRODUCTION
Analysis of the structural parameters that influence gas production from the Devonian shale, volume 1
[DOE/ET-12138/T1-VOL-1] N81-23318
FUEL TESTS
Ethanol fuel modification for highway vehicle use
[ALO-3683-T1] N81-23306
FUELS
Development of analytical reference materials for refuse-derived fuels
[PB81-135030] N81-23323
FULL SCALE TESTS
Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel
[NASA-TM-81285] N81-23039
FUNCTIONAL DESIGN SPECIFICATIONS
Demonstration Advanced Avionics System (DAAS) functional description --- Cessna 402B aircraft
[NASA-CR-152405] N81-23080
Verification of payload specifications for Symphonie satellites N81-23110
Applicative specifications of distributed systems: Extending them to embedded systems
[AD-A097280] N81-23808
FUNCTIONS (MATHEMATICS)
A goodness-of-fit test based on spacings
[AD-A097613] N81-23851
FURNACES
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267
FUSION REACTORS
Health and safety: Preliminary comparative assessment of the Satellite Power System (SPS) and other energy alternatives
[NASA-CR-164215] N81-23594
Alloy development for irradiation performance in fusion reactors
[DOE/ER-10107/1] N81-23914
Research on the hylife liquid first wall concept for future laser fusion reactors
[UCRL-15314] N81-23919
Fusion component design for the moving-ring field-reversed mirror reactor
[UCID-18916] N81-23922
FUZZINESS
Fault analysis of analog electronic systems: Algorithms based on fuzzy sets N81-23373

G

GALLIUM ARSENIDES
Development of polycrystal GaAs solar cells
[SERI/PR-8032-1-T1] N81-23660
Modeling of thin-film GaAs growth
[NASA-CR-164317] N81-23926
Low-energy electron diffraction study of the surface-defect structure Ge grown epitaxially on GaAs(110)
[AD-A097599] N81-23927
Model systems for the epitaxial growth and capping of GaAs
[AD-A097410] N81-23928
GAS ANALYSIS
An integrated exhaust gas analysis system with self-contained data processing and automatic calibration
[NASA-TM-81592] N81-23435
GAS COOLING
Evaluation of distributed gas cooling of pressurized PAFC for utility power generation
[NASA-CR-165303] N81-23600
GAS DENSITY
Helium resources of the United States, 1979
[PB81-150146] N81-23582
GAS LASERS
Two-wavelength HeNe laser interferometer
[UCID-18988] N81-23456
GAS PRESSURE
Effects of internal gas pressure and microstructure on the mechanisms of hot pressing and swelling in ceramics
[COO-2713-5] N81-23293
GAS RECOVERY
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
GAS TURBINE ENGINES
The rejuvenation of properties in turbine engine hot section components by hot isostatic pressing
[AD-A097551] N81-23088
High-temperature combustion gas turbine program
[NYSERDA-80-12] N81-23470
GAS TURBINES
Assessment of gas turbine erosion. Volume 1: Assessment of available erosion data
[PB81-139685] N81-23092
Test and evaluation of methanol in a gas turbine system
[EPRI-AP-1712] N81-23307
High-reliability gas turbine combined-cycle development program. Phase 1: Summary
[EPRI-AP-1681-SU] N81-23471
High-reliability gas turbine combined-cycle development program, phase 1, volume 2
[EPRI-AP-1681-VOL-2] N81-23472
Response of a thermal barrier system to acoustic excitation in a gas turbine nuclear reactor
[GA-A-16016] N81-23866
GASEOUS FUELS
Industrial application of C-Es coal-gasification process
[FE-1545-86] N81-23308
Analysis of the structural parameters that influence gas production from the Devonian shale, volume 1
[DOE/ET-12138/T1-VOL-1] N81-23318
GASES
Thermochemistry of gaseous compounds of metals
[AD-A097352] N81-23210
Preconcentration methods for the determination of gaseous sulfur compounds in air N81-23710
GASIFICATION
Coal combustion aerothermochemistry research
[DOE/ER-10029/T1] N81-23216
Guide for the assessment of the reliability of gasification-combined-cycle power plants
[EPRI-AP-1610] N81-23704
GASOHOL (FUEL)
Ethanol fuel modification for highway vehicle use
[ALO-3683-T1] N81-23306
Ethanol production in northern New York: Technical and economic feasibility
[PB81-144438] N81-23322
GASOLINE
Ethanol fuel modification for highway vehicle use
[ALO-3683-T1] N81-23306
Propane conversion in the vehicle fleet at the Idaho National Engineering Laboratory
[EGG-TRANS-5291] N81-23977
GAUGE THEORY
Grand unification and possible matter-antimatter domain structure in the universe
[NASA-TM-82083] N81-23986
GELS
Thick phase holograms
[AD-A097201] N81-23436
GENERAL AVIATION AIRCRAFT
General Aviation Activity and Avionics Survey
[AD-A097604] N81-23081
GEOCHEMISTRY
Analysis of the structural parameters that influence gas production from the Devonian shale, volume 1
[DOE/ET-12138/T1-VOL-1] N81-23318
GEODESY
An analysis of source structure effects in radio interferometry measurements
[NASA-CR-164285] N81-23344
GEOLOGICAL SURVEYS
Evaluation of hydrothermal resources of North Dakota, phase 1
[DOE/ID-12030/12] N81-23568
GEOLOGY
Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon
[PB81-151995] N81-23587
The interaction of statistics and geology - finite deformations
[AD-A097463] N81-23746
Constitutive models for compressive loading of geologic materials
[UCRL-53073] N81-23757
GEOMAGNETIC LATITUDE
Changes of the Sq quiet daily variations of the geomagnetic field as a function of time of year and latitude
[AD-A097159] N81-23744
GEOMAGNETISM
Changes of the Sq quiet daily variations of the geomagnetic field as a function of time of year and latitude
[AD-A097159] N81-23744
GEOMORPHOLOGY
Contributions to a thermodynamic model of Earth systems on rivers
[NASA-CR-164272] N81-23506
GEOPHYSICS
An analysis of source structure effects in radio interferometry measurements
[NASA-CR-164285] N81-23344
Ultimate limits to error probabilities for ionospheric models based on solar geophysical indices and how these compare with the state of the art N81-23538
Solar-geophysical data number 433. Part 2: (Comprehensive Reports) Data for August 1980, July 1980, March 1980, and miscellanea
[PB81-145286] N81-23994
Solar-geophysical data number 433. Part 1: (Prompt Reports) Data for August 1980, July 1980, March 1980 and late data
[PB81-145278] N81-23995
GEOTHERMAL ENERGY EXTRACTION
Testing geopressured geothermal reservoirs in existing wells
[DOE/ET-27081/2] N81-23570
Preliminary analysis of two aspects of magma-powered electric-generation plants
[SAND-80-1522] N81-23687
Geothermal energy geopressure subprogram
[DOE/EA-0134] N81-23721
GEOTHERMAL ENERGY UTILIZATION
Market study for direct utilization of geothermal resources by selected sectors of economy
[DOE/RA-50108/T1] N81-23631
Direct application of geothermal energy at the L'eggs Product Plant, Las Cruses, New Mexico
[DOE/ID-12047/3] N81-23636
Research and development of a 3 MW power plant from the design, development, and demonstration of a 100 KW power system utilizing the direct contact heat exchanger concept for geothermal brine recovery project
[DOE/ET-28456/T1] N81-23656
Exploratory benefit-cost analysis of environmental controls on hydrothermal energy
[PNL-3527] N81-23725
GEOTHERMAL RESOURCES
Next steps in two-phase flow: Executive summary
[DOE/ET-27225/12] N81-23429
Evaluation of hydrothermal resources of North Dakota, phase 1
[DOE/ID-12030/12] N81-23568
Testing geopressured geothermal reservoirs in existing wells
[DOE/ET-27081/2] N81-23570
Market study for direct utilization of geothermal resources by selected sectors of economy
[DOE/RA-50108/T1] N81-23631
Analyses of mixed-hydrocarbon binary thermodynamic cycles for moderate-temperature geothermal resources
[EGG-PG-G-80-041] N81-23644
Preliminary analysis of two aspects of magma-powered electric-generation plants
[SAND-80-1522] N81-23687
Review of the geothermal reservoir well stimulation program
[LA-UR-81-26] N81-23701
GEOTHERMAL TECHNOLOGY
Localized corrosion in materials for geothermal power --- using brines with and without saturated hydrogen sulfide
[DOE/ET-28317/T1] N81-23256
GERMANIUM
High-pressure viewports for infrared systems. Phase 1: Germanium --- underwater vehicle applications
[AD-A097089] N81-23897
Low-energy electron diffraction study of the surface-defect structure Ge grown epitaxially on GaAs(110)
[AD-A097599] N81-23927

GERMANY
The Symphonie program: Objectives, operations and technical operations of the project N81-23103
Weather scenarios for central Germany
[AD-A097527] N81-23771
National information services with international orientation N81-23959
GERT
An investigation of several branching functions in a branch and bound algorithm for the chromatic number problem
[AD-A097330] N81-23820
Some results on the overall reliability of undirected graphs
[AD-A097445] N81-23832
GLASS
Thermally stimulated currents in glasses N81-23272
Thermally stimulated polarization and depolarization current (TSPC/TSDC) in glass N81-23273
Glass ceramics for sealing to high-thermal-expansion metals
[SAND-80-2192] N81-23297
Development of analytical reference materials for refuse-derived fuels
[PB81-135030] N81-23323
GLIDE PATHS
Application of variable structure system theory to aircraft flight control --- AV-8A and the Augmentor Wing Jet STOL Research Aircraft
[NASA-CR-164321] N81-23093
GLOW DISCHARGES
Glow discharge as an atomization and ionization device
[DOE/ER-10635/T1] N81-23911
GOODNESS OF FIT
A comparison of the ANCILLES and LOGIST parameter estimation procedures for the three-parameter logistic model using goodness of fit as a criterion
[AD-A097081] N81-23858
GOVERNMENTS
Federal-State environmental programs: The State perspective
[CED-80-106] N81-23711
Information services for legislative policy making N81-23965
GRAIN BOUNDARIES
Defect structure of EFG silicon ribbon
[NASA-CR-164324] N81-23618
Computer simulation study of the structure of vacancies in grain boundaries
[DOE/ER-05002/15] N81-23931
Influence of grain boundaries on the electrical properties of polycrystalline-silicon films
[DOE/ER-02899/T2] N81-23933
GRAMMARS
An adaptation of the ADA language for machine generated compilers
[AD-A097292] N81-23819
GRAPHITE
Synthesis and properties of highly conducting derivatives of polyacetylene, polyparaphenyleneand graphite N81-23274
GRAPHITE-EPOXY COMPOSITE MATERIALS
Fatigue degradation in compressively loaded composite laminates --- graphite-epoxy composites
[NASA-CR-165681] N81-23192
Creep and creep rupture of laminated graphite/epoxy composites
[NASA-CR-164297] N81-23193
GRAPHS (CHARTS)
An investigation of several branching functions in a branch and bound algorithm for the chromatic number problem
[AD-A097330] N81-23820
Decision graphs: A tool for developing real time software
[LA-UR-80-3502] N81-23823
Some results on the overall reliability of undirected graphs
[AD-A097445] N81-23832
GRASSES
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
GRASSLANDS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
GRATINGS (SPECTRA)
Thick phase holograms
[AD-A097201] N81-23436
GRAVITATION
Analytical treatment of gravity effects on gas loaded variable conductance heat pipes
[AD-A097679] N81-23629
GRAVITY WAVES
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531
Large-scale waves in the ionosphere observed by the AE satellite N81-23534
The generation and propagation of atmospheric gravity waves with special reference to radio propagation N81-23535
A general inverse solution for 2D edge waves
[AD-A097683] N81-23748
Ionospheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760
GREASES
Test methods and results of a study of greases for use in roto-launch valve lubrication
[AD-A097565] N81-23289
GREAT LAKES (NORTH AMERICA)
Method for analysis of organic compounds in the Great Lakes
[PB81-149783] N81-23578
GREAT PLAINS CORRIDOR (NORTH AMERICA)
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
GREAT SALT LAKE (UT)
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
GREEN WAVE EFFECT
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
GREENHOUSES
Winter experience of a passive solar retrofit
[DOE/CS-34127/1] N81-23630
GRINDING (COMMINUTION)
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T2] N81-23460
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T3] N81-23468
GROUND EFFECT (AERODYNAMICS)
Investigation of the interaction of lift jets and a ground plane --- wall jet radial momentum flux from rectangular nozzles
[NASA-CR-152343] N81-23026
GROUND SPEED
Groundspeed/airspeed differences as a wind shear indicator and flight evaluation of a DME-derived system to determine groundspeed
[AD-A097566] N81-23768
GROUND STATIONS
Experimental utilization of the Symphonie system during the first 5 years of operation N81-23104
The Symphonie ground stations N81-23107
Transmission of TDMA signals at 60 Mbit/s in the Symphonie system N81-23113
Acceptance and operation of small receiving stations in urban areas N81-23137
Transportable terminals for STEP N81-23138
Highly mobile Earth stations --- Antenna design and packaging N81-23139
Transportable ground stations --- for Symphonie N81-23140
Step tracking system --- for Symphonie N81-23141
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142
Telecommunications services for special events --- Symphonie applications N81-23160
GROUND TRUTH
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
GROUND WATER
Underground residence times and chemical quality of basal groundwater in Pearl Harbor and Honolulu aquifers, Oahu, Hawaii
[PB81-135444] N81-23577
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586
Ground water overdrafting must be controlled
[PB81-156135] N81-23589
Microprocessor control of a ground water heat pump
[DOE/R5-10149/2] N81-23658
GUIDANCE (MOTION)
Homing missile guidance studies: Observability, adaptability
[AD-A097624] N81-23178
GUIDANCE SENSORS
The attitude sensors on Symphonie and their subsequent development N81-23165
GULF OF CALIFORNIA (MEXICO)
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta
[AD-A097429] N81-23774
GULF STREAM
Flux of energy and essential elements through the continental shelf ecosystem
[DOE/EV-00639/22] N81-23728
GUMS (SUBSTANCES)
Effect of vinyl and phenyl contents of silicone gum on the properties of the elastomers and cellular silicone cushions
[UCRL-53105] N81-23298
GUNNERY TRAINING
A human operator gunner model for a tracking task with interrupted observations in an antiaircraft artillery system
[AD-A097360] N81-23803
GUST LOADS
Transonic flutter and gust-response tests and analyses of a wind-tunnel model of a torsion free wing airplane
[NASA-TM-81961] N81-23072
GYROSCOPES
Microprocessor generated vertical gyrohorizon instrument for the Blue Bird simulator
[AD-A097658] N81-23098

H

HABITATS
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
HADRONS
High-energy hadron-hadron collisions
[DOE/ER-00946/T1] N81-23877
HALL GENERATORS
Preliminary investigation of acoustic oscillations in an H2-O2 fired Hall generator
[NASA-TM-81756] N81-23610
HAMILTONIAN FUNCTIONS
The Hamiltonian structure of the Maxwell-Vlasov Equations
[AD-A097412] N81-23834
HANDBOOKS
US Department of Energy environmental compliance program handbook: Federal regulations on air quality, fossile energy
[ORNL/EIS-176] N81-23727
The oceanographic environmental reference service retrieval program users guide
[AD-A097340] N81-23947
HARDNESS
Hardness tests on irradiated pressure vessel steel
[IS-T-942] N81-23259

HARRIER AIRCRAFT
Application of variable structure system theory to aircraft flight control --- AV-8A and the Augmentor Wing Jet STOL Research Aircraft
[NASA-CR-164321] N81-23093
HAULING
Design optimization in underground coal systems. Volume 6: LHDSIM: A load-haul-dump simulator for room-and-pillar mining systems
[FE-1231-24-VOL-6] N81-23569
HAWAII
Underground residence times and chemical quality of basal groundwater in Pearl Harbor and Honolulu aquifers, Oahu, Hawaii
[PB81-135444] N81-23577
HAY
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
HAZARDS
Controlled burnout of wasted coal on abandoned coal mine lands
[PB81-148231] N81-23234
HAZE
Air mass considerations in fog optical modeling
[AD-A097609] N81-23772
HEAD (ANATOMY)
Tolerance of the head and neck to -G sub x inertial loading of the head
[AD-A097632] N81-23789
Simulation analysis of head/neck impact response for helmeted and unhelmeted motorcyclists
[PB81-145377] N81-23804
HEAD-UP DISPLAYS
Preliminary study of head-up assessment techniques. 1: Viewing duration of instrument panel and HUD symbology using a recall methodology
[NASA-TM-78517] N81-23798
A preliminary study of head-up display assessment techniques. 2: HUD symbology and panel information search time
[NASA-TM-78536] N81-23799
HEALTH PHYSICS
Health and safety: Preliminary comparative assessment of the Satellite Power System (SPS) and other energy alternatives
[NASA-CR-164215] N81-23594
HEAT
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
HEAT BALANCE
An analysis of thermal balance in the cooled cabin of a Sea King Helicopter
[AD-A097199] N81-23077
HEAT CAPACITY MAPPING MISSION
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
Heat Capacity Mapping Mission (HCMM) thermal surface water mapping and its correlation to LANDSAT --- Lake Anna, Virginia
[E81-10137] N81-23546
HEAT EXCHANGERS
Development of nondestructive evaluation techniques for high-temperature ceramic heat exchanger components
[ANL-80-123] N81-23292
Next steps in two-phase flow: Executive summary
[DOE/ET-27225/12] N81-23429
Evaluation of distributed gas cooling of pressurized PAFC for utility power generation
[NASA-CR-165303] N81-23600
Solar heating and hot water system installed at Charlotte Memorial Hospital, Charlotte, North Carolina
[NASA-CR-161731] N81-23606
Research and development of a 3 MW power plant from the design, development, and demonstration of a 100 KW power system utilizing the direct contact heat exchanger concept for geothermal brine recovery project
[DOE/ET-28456/T1] N81-23656
HEAT GENERATION
Heat generation in aircraft tires under free rolling conditions
[NASA-CR-164273] N81-23461
District heating from electric-generating plants and municipal incinerators: Local planners assessment guide
[ANL/CNSV-12] N81-23699
HEAT MEASUREMENT
Hot spot initiation patterns in shocked explosives and propellants recorded by thermal film
[AD-A097088] N81-23305
HEAT PIPES
Study of a temperature-stabilized heat pipe system with electrical feedback
[IKE-5-196] N81-23649
HEAT PUMPS
Microprocessor control of a ground water heat pump
[DOE/R5-10149/2] N81-23658
Performance monitoring of ground-coupled solar-assisted heat pump systems
[EPRI-EM-1697] N81-23696
HEAT RESISTANT ALLOYS
The fracture morphology of nickel-base superalloys tested in fatigue and creep-fatigue at 650 C
[NASA-TM-81740] N81-23244
Synergistic erosion/corrosion of superalloys in PFB coal combustor effluent
[NASA-TM-81715] N81-23245
High temperature low cycle fatigue data for three high strength nickel-base superalloys
[AD-A097430] N81-23246
Manufacturing process feasibility study
[UCRL-15319] N81-23251
HEAT SOURCES
Space nuclear safety and fuel program
[LA-8749-PR] N81-23189
The strontium heat source development program
[PNL-1845-48] N81-23503
HEAT STORAGE
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604
Design, fabrication, and bench testing of a solar chemical receiver
[NASA-CR-164333] N81-23620
Solar passive ceiling system
[DOE/R5-10148/2] N81-23637
Economic assessment of advanced central-receiver solar-thermal power system. Executive summary
[DOE/SF-10601/T1] N81-23680
Economic assessment of advanced central-receiver solar-thermal power systems: PG and E assessment
[DOE/SF-10601/2] N81-23682
HEAT TRANSFER
A comparison of laboratory measured temperatures with predictions for a spar/skin type aircraft structure
[NASA-TM-81359] N81-23067
Calculating building heating and cooling loads using the frequency response of multilayered slabs
[AD-A097597] N81-23326
Experimental and theoretical investigation of droplet deposition and heat transfer in air-water dispersed flow N81-23409
Turbulent flow and heat transfer in passage around 180 degree bend: An experimental and numerical study
[AD-A097461] N81-23421
Investigation of heat transfer in straight and curved rectangular ducts
[AD-A097368] N81-23422
Analytical treatment of gravity effects on gas loaded variable conductance heat pipes
[AD-A097679] N81-23629
Performance monitoring of ground-coupled solar-assisted heat pump systems
[EPRI-EM-1697] N81-23696
HEAT TRANSMISSION
Thermal resistance measurements of a built-up roof system
[PB81-140063] N81-23332
Calculated operating temperatures of thermally insulated electric cables
[PB81-145781] N81-23400
HEAT TREATMENT
X-ray diffraction measurement of residual stress (strain): Energy dispersive X-ray residual stress measurement N81-23480
HEAVY IONS
Semiconductor detectors for medical tomography with high-energy heavy ions
[LBL-11037] N81-23790
Particle simulation code for longitudinal dynamics of heavy ion beams
[LBL-12205] N81-23910
HELICOPTERS
An analysis of thermal balance in the cooled cabin of a Sea King Helicopter
[AD-A097199] N81-23077
A study of the effect of terrain on helicopter noise propagation by acoustical modeling
[AD-A097626] N81-23864
HELIOSTATS
Wind loading on tracking and field-mounted solar collectors
[SERI/TP-632-958] N81-23502
Financial study of commercialization of solar central receiver power systems
[DOE/SF-11421/1] N81-23640
Economic analysis of the unified heliostat array
[DOE/SF-10802/1] N81-23657
HELIUM
Helium resources of the United States, 1979
[PB81-150146] N81-23582
Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon
[PB81-151995] N81-23587
HELMETS
Simulation analysis of head/neck impact response for helmeted and unhelmeted motorcyclists
[PB81-145377] N81-23804
HETEROJUNCTION DEVICES
Thin films of InP for photovoltaic energy conversion
[COO-3004-4] N81-23632
Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661
HEWLETT-PACKARD COMPUTERS
CDC/1000: A Control Data Corporation remote batch terminal emulator for Hewlett-Packard minicomputers
[SAND-80-2548] N81-23811
HF LASERS
Materials for high-temperature hydrogen fluorine environments --- HV laser system nozzles
[Y-2201] N81-23191
HIGH ENERGY INTERACTIONS
High-energy hadron-hadron collisions
[DOE/ER-00946/T1] N81-23877
HIGH LEVEL LANGUAGES
An adaptation of the ADA language for machine generated compilers
[AD-A097292] N81-23819
HIGH PRESSURE
Interaction of slow electrons with high-pressure gases (quasi-liquids): Synthesis of our knowledge on slow electron-molecule interactions
[DOE/EV-04703/T1] N81-23875
HIGH RESOLUTION
A comparison of monopulse and interferometric systems
[AD-A097656] N81-23364
High resolution imaging of space objects --- observing binary stars from Earth
[AD-A097359] N81-23894
HIGH STRENGTH ALLOYS
Mechanical Properties Data Center
[AD-A097389] N81-23945
HIGH STRENGTH STEELS
Embrittlement of high-strength steels: Effects of impurities and hydrogen N81-23236
HIGH TEMPERATURE
Threshold tear strength of some molecular networks --- high temperatures and polymers
[AD-A097232] N81-23283
HIGH TEMPERATURE ENVIRONMENTS
Materials for high-temperature hydrogen fluorine environments --- HV laser system nozzles
[Y-2201] N81-23191
HIGH TEMPERATURE GAS COOLED REACTORS
Response of a thermal barrier system to acoustic excitation in a gas turbine nuclear reactor
[GA-A-16016] N81-23866

HIGH TEMPERATURE PLASMAS
Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905
HIGH TEMPERATURE TESTS
Test methods and results of a study of greases for use in roto-launch valve lubrication
[AD-A097565] N81-23289
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299
High-temperature combustion gas turbine program
[NYSERDA-80-12] N81-23470
High temperature solar receiver
[NASA-CR-164332] N81-23614
HIGH VOLTAGES
A high voltage linear compatible Integrated Injection Logic (IIL) structure: Process design and specifications N81-23376
Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909
HIGHWAYS
Construction procedures using self hardening fly ash
[PB81-153884] N81-23334
HILBERT SPACE
Partial characterizations of completely nondeterministic stochastic processes
[AD-A097514] N81-23844
HOLE DISTRIBUTION (ELECTRONICS)
Defect chemistry and characterization of Hg(1-x)Cd(x)Te
[NASA-CR-161746] N81-23924
Defect chemistry and characterization Hg(1-x)Cd(x)Te
[NASA-CR-161755] N81-23925
HOLES (ELECTRON DEFICIENCIES)
High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295
HOLOGRAMMETRY
Thick phase holograms
[AD-A097201] N81-23436
HOLOGRAPHIC INTERFEROMETRY
Application of holography to the study of helicopter rotor flow fields
[NASA-CR-164293] N81-23433
Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905
HOLOGRAPHY
Acoustical holographic recording with coherent optical read-out and image processing
[AD-A097299] N81-23439
HOMING
Homing missile guidance studies: Observability, adaptability
[AD-A097624] N81-23178
HOMOGENEOUS TURBULENCE
Fundamental research in turbulent modeling. Part 1: Theory. Part 2: Experiment
[AD-A097431] N81-23425
Evaluation of magnetic helicity in homogeneous turbulence
[NASA-TM-82131] N81-23900
HOT PRESSING
The rejuvenation of properties in turbine engine hot section components by hot isostatic pressing
[AD-A097551] N81-23088
Effects of internal gas pressure and microstructure on the mechanisms of hot pressing and swelling in ceramics
[COO-2713-5] N81-23293
HOVERING
Application of variable structure system theory to aircraft flight control --- AV-8A and the Augmentor Wing Jet STOL Research Aircraft
[NASA-CR-164321] N81-23093
HUBS
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies
[NASA-CR-152336-1] N81-23064
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065
HUMAN BEINGS
A motion cycle simulator for analysis and optimization of human power N81-23797
HUMAN BODY
A motion cycle simulator for analysis and optimization of human power N81-23797
HUMAN FACTORS ENGINEERING
User acceptance of an energy efficient office building, a study of the Norris Cotton Federal Office Building
[PB81-147365] N81-23335
Applications of event-related brain potentials in human engineering
[AD-A097542] N81-23795
Instructor/operator display evaluation methods
[AD-A097208] N81-23802
The design of computer based integrated information displays N81-23942
HUMAN PERFORMANCE
Applications of event-related brain potentials in human engineering
[AD-A097542] N81-23795
Computer simulation of human performance in electronic processed imagery systems
[AD-A097622] N81-23801
HUMAN REACTIONS
Cumulative annoyance due to multiple aircraft flyover with differing peak noise levels
[NASA-CR-3417] N81-23712
An airport community noise-impact assessment model
[NASA-TM-80198] N81-23713
HUMIDITY
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759
HURRICANES
Ionospheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760
HYBRID COMPUTERS
Processing of AIDS flight recorder data for a quick look with the aid of a hybrid computer system N81-23023
HYDRAULIC EQUIPMENT
Optimum design of untethered wave energy generation systems N81-23403
HYDROCARBON FUELS
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161760] N81-23184
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161759] N81-23185
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161748] N81-23186
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
HYDROCARBONS
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262
Bioassay of polycyclic aromatic hydrocarbons
[DOE/EV-04477/T2] N81-23677
HYDROCHLORIC ACID
Partial pressures of gaseous HCl and H2O over aqueous solutions of HCl, AlCl3, and FeCl3
[PB81-147381] N81-23232
HYDRODYNAMICS
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785
HYDROELECTRIC POWER STATIONS
Environmental issues and site selection criteria for small hydropower projects in developing countries
[ORNL/TM-7620] N81-23720
HYDROFLUORIC ACID
Materials for high-temperature hydrogen fluorine environments
[AD-A097426] N81-23190
HYDROGEN
Chemical diffusion on solid surfaces
[COO-4220-4] N81-23224
Hydrogen attack of pressure-vessel steel
[DOE/ER-02872/5] N81-23258
Survey of hydrogen monitoring devices
[UCRL-84164] N81-23444
Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905
HYDROGEN BONDS
The bonding of H to Ni, Pd and Pt surfaces --- photoelectron spectroscopy
[AD-A097361] N81-23276
HYDROGEN COMPOUNDS
Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226
HYDROGEN EMBRITTLEMENT
Embrittlement of high-strength steels: Effects of impurities and hydrogen N81-23236
HYDROGEN MASERS
A frequency and timing subsystem for the ORION mobile unit N81-23999
HYDROGEN OXYGEN ENGINES
Traction drive for cryogenic boost pump --- hydrogen oxygen rocket engines
[NASA-TM-81704] N81-23188
HYDROGEN SULFIDE
Localized corrosion in materials for geothermal power --- using brines with and without saturated hydrogen sulfide
[DOE/ET-28317/T1] N81-23256
HYDROGEN-BASED ENERGY
Molten carbonate fuel cell system verification and scale-up
[EPRI-EM-1481] N81-23651
HYDROGENATION
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262
An investigation of unique metal complexes produced using polystyrene 2,2 prime-bipyridine as a support, and several hydrogenation catalysts derived from this copolymer
[AD-A097174] N81-23285
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels (riser cracking of coal)
[DOE/ET-10520/1] N81-23314
HYDROGEOLOGY
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
HYDROLOGY
Relationships of dispersive mass transport and stochastic convective flow through hydrologic systems
[PNL-3302] N81-23428
HYDROLOGY MODELS
Contributions to a thermodynamic model of Earth systems on rivers
[NASA-CR-164272] N81-23506
HYDROMETALLURGY
Experimental processing of salt slags from an aluminum dross furnace
[PB81-135022] N81-23264
HYDROPYROLYSIS
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels (riser cracking of coal)
[DOE/ET-10520/1] N81-23314
HYDROSTATICS
The generation and propagation of atmospheric gravity waves with special reference to radio propagation N81-23535
HYDROTHERMAL SYSTEMS
Evaluation of hydrothermal resources of North Dakota, phase 1
[DOE/ID-12030/12] N81-23568
Exploratory benefit-cost analysis of environmental controls on hydrothermal energy
[PNL-3527] N81-23725
HYDROXYL RADICALS
Synthesis of hydroxy-terminated dinitropropyl acrylate polymers
[AD-A097577] N81-23291
Solar extinction radiometry
[NASA-CR-164290] N81-23993

HYPERSONIC VEHICLES
A comparison of laboratory measured temperatures with predictions for a spar/skin type aircraft structure
[NASA-TM-81359] N81-23067

I

ICE
Penetration of solar radiation in snow-ice covered water reservoirs: Winterkill
[PB81-149643] N81-23584

ICE FORMATION
Rotorcraft aviation icing research requirements: Research review and recommendations
[NASA-CR-165344] N81-23070
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780

ICE PREVENTION
Commercial aviation icing research requirements
[NASA-CR-165336] N81-23069
Rotorcraft aviation icing research requirements: Research review and recommendations
[NASA-CR-165344] N81-23070

ICE REPORTING
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565

IDAHO
Shaft design in the Coeur d'Alene Mining District, Idaho: Results of in situ stress and physical property measurements
[PB81-148199] N81-23591

ILLINOIS
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
Illinois biomass resources. Annual crops and residues; canning and food-processing wastes, preliminary assessment
[ANL/EMR-6] N81-23573

ILLUMINATING
User acceptance of an energy efficient office building, a study of the Norris Cotton Federal Office Building
[PB81-147365] N81-23335

IMAGE CONTRAST
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545

IMAGE ENHANCEMENT
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437

IMAGE PROCESSING
Advanced wavefront sensor concepts
[AD-A097187] N81-23391
Acoustical holographic recording with coherent optical read-out and image processing
[AD-A097299] N81-23439
Basic research planning in mathematical pattern recognition and image analysis
[NASA-CR-160946] N81-23561
An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery
[NASA-CR-164279] N81-23562
Automatic methods in image processing and their relevance to map-making
[AD-A097377] N81-23566
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871
Studies in digital optical processing N81-23886
Sensor image prediction techniques
[AD-A097638] N81-23895

IMAGE RECONSTRUCTION
Maximum entropy image estimation analysis of image formation with thinned random arrays
[AD-A097357] N81-23349

IMAGE RESOLUTION
Modeling misregistration and related effects on multispectral classification
[NASA-CR-164282] N81-23563

IMAGERY
End-to-end quality measure for transmission of compressed imagery over a noisy coded channel
N81-24007

IMAGING TECHNIQUES
Polyurethane fan-out waveguide arrays and computer simulation to control crosstalk in imaging arrays N81-23340
Space systems: An auroral imaging spectrophotometer (vacuum ultraviolet and visible)
[PB81-133621] N81-23446
Reconnaissance Sensor System exploitation
[AD-A097224] N81-23567
Effects of surface-mapping corrections and synthetic-aperture focusing techniques on ultrasonic imaging
[EGG-FM-5314] N81-23865
High resolution imaging of space objects --- observing binary stars from Earth
[AD-A097359] N81-23894

IMPACT TESTS
Impact and penetration problems
[AD-A097413] N81-23463
Impacted notch bend specimen --- aluminum alloys
[AD-A097131] N81-23495

IMPEDANCE
Termination of surface acoustic wave velocity and impedance differences between metal strips and free surface regions of metallic gratings
[AD-A097337] N81-23386

IMPURITIES
Embrittlement of high-strength steels: Effects of impurities and hydrogen N81-23236
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613

IN-FLIGHT MONITORING
Contributions to the 9th Symposium on aircraft integrated data systems --- Conferences
[ESA-TT-532] N81-23008
Experiences with a Flight Data Recording System (FDRS) in a German Airforce fighter bomber wing after field trials --- digital equipment N81-23009
Engine parameter trend analysis with LEADS 200: Possibilities and limitations --- using flight recorder data N81-23010
Investigations into local fault detection on turbojet engines --- monitoring instruments N81-23011
The engine usage monitoring system: An heuristic approach to cost effective data monitoring and analysis --- onboard fatigue monitoring N81-23013
Relationships for a flight performance computer N81-23014
Classification of operating conditions of turbomachines from solid borne sound N81-23015
The SYDAS flight data processing system N81-23018
The use of aircraft integrated data system at KLM --- performance monitoring N81-23019
Detection and location of faults in onboard aircraft systems with the aid of the Automatic Fault Identification System (AFIS) N81-23022
Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters
[AD-A097283] N81-23438

INCINERATORS
District heating from electric-generating plants and municipal incinerators: Local planners assessment guide
[ANL/CNSV-12] N81-23699

INCLUSIONS
The elasto-plastic behavior of inclusions N81-23238

INCOHERENT SCATTER RADAR
Midlatitude sporadic-E layers N81-23530

INCOMPRESSIBLE FLOW
Mean-flow and turbulence measurements in the vicinity of the trailing edge of an NACA (63 sub 1)-012 airfoil
[NASA-TP-1845] N81-23410

INDEPENDENT VARIABLES
Parametric cost methodology
[AD-A097537] N81-23855
A comparison of the ANCILLES and LOGIST parameter estimation procedures for the three-parameter logistic model using goodness of fit as a criterion
[AD-A097081] N81-23858

INDEXES (DOCUMENTATION)
National Energy Information System basic concepts
[DOE/EIA-0229] N81-23951
Energy information referral directory, fourth quarter 1980
[DOE/EIA-0205(80-4Q)] N81-23952

INDIAN SPACE PROGRAM
Satellite telecommunications experiments project: An overview N81-23111
Indian domestic satellite (INSAT) system N81-23168

INDIUM PHOSPHIDES
Thin films of InP for photovoltaic energy conversion
[COO-3004-4] N81-23632

INDUSTRIAL AREAS
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572

INDUSTRIAL ENERGY
Industrial application of C-Es coal-gasification process
[FE-1545-86] N81-23308
Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678
Regional comparisons of on-site solar potential in the residential and industrial sectors
[LBL-11789] N81-23695
Solar enhanced oil recovery: A potential early market for industrial solar energy
[SAND-80-1869C] N81-23702
Learning to look ahead: The need for a national materials policy and planning process
[EMD-79-30] N81-23974

INDUSTRIAL PLANTS
A study of poultry processing plant noise control techniques
[NASA-CR-164291] N81-23863

INDUSTRIAL SAFETY
Guide to substation grounding and bonding for mine power systems
[PB81-148264] N81-23592

INDUSTRIES
Market study for direct utilization of geothermal resources by selected sectors of economy
[DOE/RA-50108/T1] N81-23631

INELASTIC SCATTERING
Fluorescent scattering by molecules embedded in small particles
[DOE/EV-04361/T2] N81-23869
Elastic scattering of polarized deuterons from hydrogen at 2.0, 1.6, and 1.2 GeV and search for critical opalescence in elastic scattering of protons from carbon-12 at 800 MeV
[LA-8662-T] N81-23872

INERTIAL CONFINEMENT FUSION
KrF laser fusion: Perform optical systems study of direct short pulse extraction
[DOE/DP-40069/3] N81-23454

INFORMATION DISSEMINATION
Biomass energy systems information user study
[SERI/TR-751-748] N81-23690
Active solar heating and cooling information user study
[SERI/TR-751-747] N81-23691
Management: A continuing bibliography with indexes
[NASA-SP-7500(15)] N81-23936
Database searching and document delivery via communications satellite
[AIP-80-1] N81-23944
The executives guide to data resource management
[PB81-153520] N81-23954

INFORMATION FLOW
The experimental use of the Symphonie satellite during the 19th session of the General Conference - UNESCO --- teleconferences N81-23157
The executives guide to data resource management
[PB81-153520] N81-23954

INFORMATION MANAGEMENT
Defense SDI: A useful current awareness system
[AD-A097084] N81-23946
Portuguese scientific and technical information scene: Present status and future prospects N81-23957
Use of external information services N81-23960
ARIANE: Building data bank N81-23961

INFORMATION RETRIEVAL
Mechanical Properties Data Center
[AD-A097389] N81-23945
The oceanographic environmental reference service retrieval program users guide
[AD-A097340] N81-23947
Information services: Their organization, control and use --- conferences
[AGARD-CP-294] N81-23955
Information transfer: Barriers and trends N81-23956
Introduction of on-line searching in information services N81-23962
Survey of solutions to the delivery problems. Growth control of library collections N81-23963
Library records: In-house file creation versus external services N81-23964

INFORMATION SYSTEMS
Evaluation of the Transcribed Weather Broadcast (TWEB) system and alternatives. Volume 2: Cost analyses of the TWEB radio and telephone accessible mass weather dissemination services
[AD-A097567] N81-23769
Management: A continuing bibliography with indexes
[NASA-SP-7500(15)] N81-23936
System data structures for on-line distributed data base management system
[UCID-18912] N81-23950
Information services: Their organization, control and use --- conferences
[AGARD-CP-294] N81-23955
Euronet and its interlinking to other networks N81-23958
National information services with international orientation N81-23959
Use of external information services N81-23960
Introduction of on-line searching in information services N81-23962
Information services for legislative policy making N81-23965

INFORMATION THEORY
Minimum-cross-entropy spectral analysis of multiple signals
[AD-A097531] N81-23384
Multiple objective evaluation and choicemaking under risk with partial preference infomation
[AD-A097418] N81-23941
Information transfer: Barriers and trends N81-23956

INFRARED DETECTORS
Materials processing threshold report. 1: Semiconductor crystals for infrared detectors
[NASA-CR-161752] N81-23100

INFRARED IMAGERY
Modeling misregistration and related effects on multispectral classification
[NASA-CR-164282] N81-23563
Reconnaissance Sensor System exploitation
[AD-A097224] N81-23567
Development of infrared and microwave techniques for cloud parameter inference from satellite imagery and sounder data
[AD-A097592] N81-23770
High-pressure viewports for infrared systems. Phase 1: Germanium --- underwater vehicle applications
[AD-A097089] N81-23897

INFRARED RADIATION
Competing reaction channels in IR-laser-induced unimolecular reactions
[LBL-12213] N81-23455
Earth limb radiance transformation
[AD-A097523] N81-23753

INFRARED SPECTRA
Infrared hole - Burning spectroscopy of matrix isolated ReO4(-) molecules N81-23447

INFRARED SPECTROSCOPY
An experimental study of electronic states at metal dielectric interfaces
[AD-A097363] N81-23929

INFRARED TRACKING
High-pressure viewports for infrared systems. Phase 1: Germanium --- underwater vehicle applications
[AD-A097089] N81-23897

INLET FLOW
Calculation of two-dimensional inlet flow fields by an implicit method including viscous effects: User's manual
[NASA-CR-3412] N81-23027

INORGANIC COMPOUNDS
Thermochemistry of gaseous compounds of metals
[AD-A097352] N81-23210

INPUT
Investigation of some multiple input/output frequency response function experimental modal analysis techniques N81-23481

INSOLATION
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Access to solar energy: The problem and its current status
[SAND-80-7081] N81-23635

INSPECTION
Examination of distance measuring devices
[PB81-147332] N81-23445
A basis for traceable NDE measurements
[PB81-145757] N81-23478

INSTRUMENT COMPENSATION
Compensatory control of form error in machining N81-23459

INSTRUMENT ORIENTATION
Effects of curved approach paths and advanced displays on pilot scan patterns
[NASA-TP-1846] N81-23791

INSULATION
A study of poultry processing plant noise control techniques
[NASA-CR-164291] N81-23863

INTEGRAL TRANSFORMATIONS
On certain integrals which pertain to the forced vibration of plates
[NASA-CR-166175] N81-23488

INTEGRATED CIRCUITS
Quasi-optical techniques for millimeter and submillimeter-wave circuits
[AD-A097355] N81-23388

INTEGRATED ENERGY SYSTEMS
Direct application of geothermal energy at the L'eggs Product Plant, Las Cruses, New Mexico
[DOE/ID-12047/3] N81-23636
Economic assessment of advanced central-receiver solar-thermal power system. Executive summary
[DOE/SF-10601/T1] N81-23680
Economic assessment of advanced central-receiver solar-thermal power systems: PG and E assessment
[DOE/SF-10601/2] N81-23682
Fuel cell power plant integrated systems evaluation
[EPRI-EM-1670] N81-23694
Guide for the assessment of the reliability of gasification-combined-cycle power plants
[EPRI-AP-1610] N81-23704

INTEGRATED OPTICS
High precision fiber development
[AD-A097444] N81-23891

INTELSAT SATELLITES
INTELSAT V-B (F-1) launch
[NASA-TM-82349] N81-23176

INTERFACIAL ENERGY
An experimental study of electronic states at metal dielectric interfaces
[AD-A097363] N81-23929

INTERFEROMETERS
High resolution imaging of space objects --- observing binary stars from Earth
[AD-A097359] N81-23894

INTERFEROMETRY
An analysis of source structure effects in radio interferometry measurements
[NASA-CR-164285] N81-23344
A comparison of monopulse and interferometric systems
[AD-A097656] N81-23364
Quantitative measurements in laser-induced plasmas using optical probing
[COO-4001-8] N81-23912

INTERNAL COMBUSTION ENGINES
Preliminary assessment of the impact of flywheel energy storage technology on taxicab fleet operation in a large metropolitan city
[LA-8722-MS] N81-23685
Advanced electric vehicle
[UCRL-53089] N81-23981

INTERNAL WAVES
Feasibility of large scale deliberate tracer release experiments in or below the oceanic thermocline
[DOE/EV-10038/1] N81-23783

INTERNATIONAL COOPERATION
Experimental utilization of the Symphonie system during the first 5 years of operation N81-23104
Organization and operational configuration of the Symphonie ground control system N81-23146
Disaster relief communications via the Symphonie satellite N81-23159
National information services with international orientation N81-23959

INTERNATIONAL RELATIONS
An assessment of Markov renewal models in forecasting international affairs
[AD-A097295] N81-23839

INTERNATIONAL SOLAR POLAR MISSION
ISPM X-band uplink technology demonstration. Part 1: Overview N81-24006

INTERPLANETARY MAGNETIC FIELDS
Magnetospheric and ionospheric flow and the interplanetary magnetic field --- atmospheric effects N81-23510
Solar-geophysical data number 433. Part 1: (Prompt Reports) Data for August 1980, July 1980, March 1980 and late data
[PB81-145278] N81-23995

INTERRUPTION
Analysis of brief duration losses and error structures in satellite links N81-23125

INVERSIONS
A single-expression formula for inverting strain-life and stress-strain relationships
[NASA-CR-165347] N81-23491

INVISCID FLOW
Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051

IODINE
Defect chemistry and characterization Hg(1-x)Cd(x)Te
[NASA-CR-161755] N81-23925

ION BEAMS
Ion extraction and optics in three dimensions
[ORNL/TM-7691] N81-23899
Particle simulation code for longitudinal dynamics of heavy ion beams
[LBL-12205] N81-23910

ION CURRENTS
Thermally stimulated currents in glasses N81-23272
Thermally stimulated polarization and depolarization current (TSPC/TSDC) in glass N81-23273

ION CYCLOTRON RADIATION
Analytical applications of ion cyclotron resonance mass spectroscopy N81-23201

ION EMISSION
The emission of electrons and positive ions from fracture of materials
[AD-A097390] N81-23194

ION EXCHANGE RESINS
Ion chromatography with low-capacity resins and low conductivity eluents
[IS-T-916] N81-23221

ION IMPLANTATION
Electrochemical corrosion behavior of alloys formed by ion implantation
[PB81-135006] N81-23266
Characterization of alloys formed by ion implantation
[PB81-148223] N81-23270
Demonstration of Pulsed Electron Beam Applications (PEBA) for fabricating small geometry semiconductor devices
[AD-A097547] N81-23382
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437
Reduced annealing temperatures in silicon solar cells
[NASA-TM-82597] N81-23627

ION SOURCES
The solar ultraviolet source for the ionosphere and its variation N81-23508
Ion extraction and optics in three dimensions
[ORNL/TM-7691] N81-23899
Glow discharge as an atomization and ionization device
[DOE/ER-10635/T1] N81-23911

IONIZATION
Glow discharge as an atomization and ionization device
[DOE/ER-10635/T1] N81-23911

IONOSPHERE
The physical basic of the ionosphere in the solar-terrestrial system
[AGARD-CP-295] N81-23507
The solar ultraviolet source for the ionosphere and its variation N81-23508
Magnetospheric and ionospheric flow and the interplanetary magnetic field --- atmospheric effects N81-23510
Magnetospheric influences on the ionosphere N81-23511
Modelling the high-latitude ionosphere N81-23514
The physics of radio wave absorption --- ionosphere N81-23515
Electrodynamics of the lower ionosphere N81-23516
The effects of auroral activity on the midlatitude ionosphere N81-23517
Currents in the auroral zone ionosphere N81-23518
Neutral winds in the polar ionosphere N81-23519
Electrical coupling between the lower atmosphere and the ionosphere N81-23520
First results from the Tromsoe ionospheric modification facility N81-23521
A summary of rocket-induced ionospheric perturbations N81-23522
Energetic 0-positive precipitation: A significant energy N81-23527
Structure of electron temperature --- satellite measurements of the ionospheric electron temperature and density N81-23529
Large-scale waves in the ionosphere observed by the AE satellite N81-23534
Ionospheric predictions for HF radio systems: The future N81-23537
Ultimate limits to error probabilities for ionospheric models based on solar geophysical indices and how these compare with the state of the art N81-23538
The day-by-day variability of the ionospheric peak density N81-23539
Some considerations upon models for ionospheric radio communications forecasting N81-23541
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743
Studies of the role of metastables and doubly ionized species in the chemical and thermal structure of the Venusian and Martian ionospheres
[NASA-CR-164329] N81-23991

IONOSPHERIC COMPOSITION
Ionospheric composition: The seasonal anomaly explained N81-23523
Energetic particle precipitation at middle and low latitudes N81-23526

IONOSPHERIC DISTURBANCES
The physical basic of the ionosphere in the solar-terrestrial system
[AGARD-CP-295] N81-23507
Ionospheric disturbances of magnetospheric origin N81-23512
DNA/PLACES, barium event JAN: Quick-look field report of 'in situ' probe measurements
[AD-A097227] N81-23751

IONOSPHERIC ELECTRON DENSITY
Structure of electron temperature --- satellite measurements of the ionospheric electron temperature and density N81-23529

IONOSPHERIC HEATING
First results from the Tromsoe ionospheric modification facility N81-23521
Energetic 0-positive precipitation: A significant energy N81-23527

IONOSPHERIC ION DENSITY
Magnetosphere-Ionosphere coupling through the auroral acceleration region N81-23513

IONOSPHERIC SOUNDING
Ionospheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760

IONS
Ion chromatography with low-capacity resins and low conductivity eluents
[IS-T-916] N81-23221
Studies of the role of metastables and doubly ionized species in the chemical and thermal structure of the Venusian and Martian ionospheres
[NASA-CR-164329] N81-23991

IRIDIUM ISOTOPES
Space nuclear safety and fuel program
[LA-8749-PR] N81-23189

IRON
Thermal analysis of malleable base white iron for quality control N81-23237
Solid-state displacement reactions between iron and nickel oxide at 1000 C N81-23240
Cladding of metals to iron by vacuum rolling
[PB81-150096] N81-23476

IRON ALLOYS
Amorphous and microcrystalline thin films of iron-base alloys for corrosion resistant coatings N81-23235
Iron-base alloys strengthened by Laves phases as substitutes for stainless steels
[PB81-150153] N81-23268
Electrochemical corrosion of iron-chromium alloys under ultra-high-purity conditions --- sulfuric acid solutions
[PB81-147134] N81-23271

IRON CHLORIDES
Partial pressures of gaseous HCl and H2O over aqueous solutions of HCl, AlCl3, and FeCl3
[PB81-147381] N81-23232

IRON COMPOUNDS
Factors influencing the redox reactions of iron porphyrins N81-23197

IRRADIATION
Reduced annealing temperatures in silicon solar cells
[NASA-TM-82597] N81-23627

IRRIGATION
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Recycling of sewage effluent by sugarcane irrigation: A dilution study, October 1976 to October 1978, Phase 2-A
[PB81-144669] N81-23983

ISIS-B
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743

ISOLATORS
A study of poultry processing plant noise control techniques
[NASA-CR-164291] N81-23863

ISOSTATIC PRESSURE
The rejuvenation of properties in turbine engine hot section components by hot isostatic pressing
[AD-A097551] N81-23088

ISRAEL
Soils of Israel and their similarity to soils of the United States
[AD-A097528] N81-23564
Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel
[AD-A097529] N81-23767

ITERATION
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters
[ISSN-0077-5606] N81-23412

J

J INTEGRAL
Linear-elastic and elastic plastic fracture mechanics of structural materials --- J integral method
[ESA-TT-649] N81-23505

J-85 ENGINE
Location of faults in jet engines by calculation of component characteristics N81-23012

JACKETS
Calculated operating temperatures of thermally insulated electric cables
[PB81-145781] N81-23400

JET ENGINES
Fuel/engine/airframe trade off study
[AD-A097391] N81-23073

JET EXHAUST
A study of real jet effects on the surface pressure distribution induced by a jet in a crossflow
[NASA-CR-166150] N81-23029
Initial validation of an ambient air quality model for Naval air operations
[AD-A097665] N81-23715

JET FLOW
Method for predicting the jet-induced aerodynamics of V/STOL configurations in transition
[AD-A097356] N81-23043

JP-4 JET FUEL
Fuel/engine/airframe trade off study
[AD-A097391] N81-23073

JP-8 JET FUEL
Fuel/engine/airframe trade off study
[AD-A097391] N81-23073

JUDGMENTS
Uncertainty measurement in a complex task as a function of response mode and event type characteristics
[AD-A097678] N81-23792
Alternative frameworks for the reconciliation of probability assessments
[AD-A097584] N81-23850

K

KALMAN FILTERS
The reconstruction of flight paths from AIDS data with the aid of modern filtering methods --- kalman filters N81-23021
Homing missile guidance studies: Observability, adaptability
[AD-A097624] N81-23178

KANSAS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586

KEYING
Selection of secondary keys and indices for a database N81-23943

KINEMATICS
Large and small deformation finite element analysis of rolling contact N81-23482

KINETIC THEORY
Kinetic theory and turbulent discontinuities --- shock tube flow
[NASA-CR-164287] N81-23413

KINETICS
Kinetics of photosensitized electron transport across a membrane boundary
[LBL-12360] N81-23223

KLYSTRONS
Satellite Power Systems (SPS) concept definition study (Exhibit D). Volume 7: System/subsystems requirements databook
[NASA-CR-3399] N81-23595

KNOWLEDGE
Information transfer: Barriers and trends N81-23956

KRYPTON FLUORIDE LASERS
KrF laser fusion: Perform optical systems study of direct short pulse extraction
[DOE/DP-40069/3] N81-23454

KUTTA-JOUKOWSKI CONDITION
Viscous effects on unsteady airloads of oscillating configurations N81-23049

L

LABRADOR
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565

LAKE ERIE
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780

LAKE ICE
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780

LAKES
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
Heat Capacity Mapping Mission (HCMM) thermal surface water mapping and its correlation to LANDSAT --- Lake Anna, Virginia
[E81-10137] N81-23546
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560
Water resources data for Arkansas, water year 1979
[PB81-144842] N81-23579
Water resources data for Alaska, water year 1979
[PB81-144818] N81-23580

LAMINAR BOUNDARY LAYER
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056

LAMINAR FLOW
Topology of three-dimensional separated flows
[NASA-TM-81294] N81-23037
Investigation of heat transfer in straight and curved rectangular ducts
[AD-A097368] N81-23422

LAMINATES
Creep and creep rupture of laminated graphite/epoxy composites
[NASA-CR-164297] N81-23193
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621

LAND MANAGEMENT
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

LAND USE
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586
Access to solar energy: The problem and its current status
[SAND-80-7081] N81-23635

LARGE SCALE INTEGRATION
Advanced wavefront sensor concepts
[AD-A097187] N81-23391

LARGE SPACE STRUCTURES
ACOSS six (Active Control Of Space Structures)
[AD-A097206] N81-23183

LASER APPLICATIONS
Pyrolysis of coal-derived fuels using the laser-powered homogeneous pyrolysis technique
[DOE/PC-30217/T1] N81-23320
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871

LASER FUSION
KrF laser fusion: Perform optical systems study of direct short pulse extraction
[DOE/DP-40069/3] N81-23454
X-ray diodes for laser fusion plasma diagnostics
[LA-7941-MS] N81-23904

LASER INTERFEROMETRY
Two-wavelength HeNe laser interferometer
[UCID-18988] N81-23456

LASER OUTPUTS
Laser assisted semiconductor device processing
[AD-A097427] N81-23452
Competing reaction channels in IR-laser-induced unimolecular reactions
[LBL-12213] N81-23455

LASER PLASMAS
Quantitative measurements in laser-induced plasmas using optical probing
[COO-4001-8] N81-23912

LASER PUMPING
Thermochemistry of gaseous compounds of metals
[AD-A097352] N81-23210

LASER SPECTROSCOPY
Infrared hole - Burning spectroscopy of matrix isolated ReO4(-) molecules N81-23447

LASER WEAPONS
A time domain simulation of a beam control system
[AD-A097423] N81-23453

LASERS
Research in laser processes
[AD-A097563] N81-23449
Ultraviolet phase conjugation and its practical implications --- laser applications
[LA-UR-81-145] N81-23898

LATITUDE
Energetic particle precipitation at middle and low latitudes N81-23526

LATTICE PARAMETERS
Numerical techniques for lattice gauge theories
[BNL-29048] N81-23932

LAW (JURISPRUDENCE)
National Aeronautics and Space Administration Authorization Act, 1982
[H-REPT-97-32] N81-23971

LEACHING
Experimental processing of salt slags from an aluminum dross furnace
[PB81-135022] N81-23264
Anti-reflection coatings applied by acid leaching process
[NASA-CR-164322] N81-23612

LEAD ACID BATTERIES
Electric and hybrid vehicles charge efficiency tests of ESB EV-106 lead acid batteries
[NASA-CR-164283] N81-23602
Development of a lead-acid battery with high energy and power density
[BMFT-FB-T-80-151] N81-23653
The electric moped
[DOE/R5-10157/2] N81-23976

LEARNING
Applications of event-related brain potentials in human engineering
[AD-A097542] N81-23795

LEARNING MACHINES
Continuing education through computer-aided instruction
[LA-UR-81-82] N81-23935

LEAST SQUARES METHOD
Recursive least squares with linear constraints
[UCRL-85330] N81-23837

LIBRARIES
Information services: Their organization, control and use --- conferences
[AGARD-CP-294] N81-23955
Survey of solutions to the delivery problems. Growth control of library collections N81-23963
Library records: In-house file creation versus external services N81-23964

LIFE CYCLE COSTS
Digital Avionics Information System (DAIS). Volume 1: Impact of DAIS concept on life cycle cost
[AD-A097339] N81-23083
Digital Avionics Information System (DAIS). Volume 2: Impact of DAIS concept on life cycle cost. Supplement
[AD-A097438] N81-23084
Cost-effectiveness of countermeasures to intergranular stress corrosion cracking in BWR piping
[EPRI-NP-1703] N81-23252
User's manual for strategic satellite system terminal segment life cycle cost model, volume 1
[AD-A097634] N81-23354
User's manual for strategic satellite system terminal segment life cycle cost model, volume 2
[AD-A097635] N81-23355
Deep space network software cost estimation model
[NASA-CR-164277] N81-23814
Life-cycle cost database design and sample data development
[AD-A097222] N81-23949

LIFE SUPPORT SYSTEMS
Aboard the space shuttle
[NASA-EP-169] N81-23179

LIFT
An asymptotic unsteady lifting-line theory with energetics and optimum motion of thrust-producing lifting surfaces
[NASA-CR-165679] N81-23035

LIFT DEVICES
An asymptotic unsteady lifting-line theory with energetics and optimum motion of thrust-producing lifting surfaces
[NASA-CR-165679] N81-23035

LIGHT BEAMS
Kinetic theory and turbulent discontinuities --- shock tube flow
[NASA-CR-164287] N81-23413
A time domain simulation of a beam control system
[AD-A097423] N81-23453

LIGHT EMISSION
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743

LIGHT SCATTERING
Comparison of the Marine Index of refraction structure parameter, C2n, model with optical measurements
[AD-A097691] N81-23776
LIGHT TRANSMISSION
Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617
Atmospheric optical propagation comparisons during MAGAT-80
[AD-A097274] N81-23752
Atmospheric transmittance/radiance computer code FASCOD2
[AD-A097593] N81-23893
LIGNITE
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299
LINE SPECTRA
On the origins of homogeneous and inhomogeneous linewidths of the (D-5)0-(F-7)0 transition of Eu-3(+) in amorphous solids
[AD-A097614] N81-23212
LINEAR ACCELERATORS
Plasmas in particle accelerators: Adiabatic theories for bunched beams
[UCID-18947] N81-23920
LINEAR FILTERS
Suppression of narrowband interference in pseudo-noise spread spectrum systems
[AD-A097336] N81-23368
LINEAR INTEGRATED CIRCUITS
A high voltage linear compatible Integrated Injection Logic (IIL) structure: Process design and specifications N81-23376
LINEAR PROGRAMMING
Binary integer linear programming: A hybrid implicit enumeration approach
[AD-A097108] N81-23817
LINEARIZATION
An assessment of theoretical models for viscous and transonic flow N81-23046
LIQUID CRYSTALS
Investigation of the use of liquid crystal thermography to study flow over turbomachinery blades
[AD-A097289] N81-23089
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290
LIQUID LITHIUM
Research on the hylife liquid first wall concept for future laser fusion reactors
[UCRL-15314] N81-23919
LIQUID OXYGEN
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161748] N81-23186
LIQUID PROPELLANT ROCKET ENGINES
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161760] N81-23184
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161759] N81-23185
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161748] N81-23186
LIQUID SLOSHING
A nonlinear analysis of liquid sloshing in rigid containers
[PB81-135204] N81-23430
LISTS
US central station nuclear electric generating units: Significant milestones, status as of October 1, 1980
[DOE/NE-0030/4(80)] N81-23700
LITHIUM
Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211
LOADING MOMENTS
Introductory remarks on boundary layer effects on unsteady airloads N81-23045
LOADING OPERATIONS
Design optimization in underground coal systems. Volume 6: LHDSIM: A load-haul-dump simulator for room-and-pillar mining systems
[FE-1231-24-VOL-6] N81-23569
LOADS (FORCES)
Viscous effects on unsteady airloads of oscillating configurations N81-23049
Some remarks on boundary layer effects on unsteady airloads N81-23050
Response of a plain and filled elastomer (Solithane 113) to high strain-rate compression, shear, and tension loading
[AD-A097455] N81-23278
Fluid forces on smooth and rough circular cylinders N81-23402
Holding capacity of plate anchors
[AD-A097116] N81-23467
Design optimization in underground coal systems. Volume 3: Structural characterization of coal
[FE-1231-21-VOL-3] N81-23575
Tolerance of the head and neck to -G sub x inertial loading of the head
[AD-A097632] N81-23789
LOCI
Properties of multivariable root loci
[NASA-CR-164319] N81-23829
LOGIC CIRCUITS
A high voltage linear compatible Integrated Injection Logic (IIL) structure: Process design and specifications N81-23376
CCD multi-level logic --- signal processing applications
[AD-A097586] N81-23816
Studies in digital optical processing N81-23886
LOGISTICS
A comparison of the ANCILLES and LOGIST parameter estimation procedures for the three-parameter logistic model using goodness of fit as a criterion
[AD-A097081] N81-23858
Weapons system support resources demand parameters - logistics
[AD-A097517] N81-23937
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 1: NDI maintenance data analysis
[AD-A097669] N81-23938
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 2: On-site data collection
[AD-A097670] N81-23939
LOGISTICS MANAGEMENT
F-16 integrated logistics support: Still time to consider economical alternatives
[PB81-137473] N81-23079
NAVAIR Avionics Master Plan
[AD-A097522] N81-23082
Disaster relief communications via the Symphonie satellite N81-23159
Development of maintenance METRICS to forecast resource demands of weapon systems (parameter polarization), revision A
[AD-A097692] N81-23325
LOOPS
Optimum design of hybrid phase locked loops N81-24010
LOW ALTITUDE
Mesoscale variability of the atmospheric wind field below 5 km
[AD-A097414] N81-23773
LOW ASPECT RATIO
Investigation of the interaction of lift jets and a ground plane --- wall jet radial momentum flux from rectangular nozzles
[NASA-CR-152343] N81-23026
Wave-driver options for low-aspect-ratio steady-state Tokamak reactors
[ANL/FPP/TM-141] N81-23915
LOWER ATMOSPHERE
Electrical coupling between the lower atmosphere and the ionosphere N81-23520
LOWER CALIFORNIA (MEXICO)
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta
[AD-A097429] N81-23774
LUBRICANTS
Test methods and results of a study of greases for use in roto-launch valve lubrication
[AD-A097565] N81-23289
NASA five-ball fatigue tester: Over 20 years of research
[NASA-TM-82589] N81-23462
LUBRICATING OILS
X-ray fluorescence spectrometric analysis of wear metals in used lubricating oils
[AD-A097552] N81-23087
LUNAR EFFECTS
The day-by-day variability of the ionospheric peak density N81-23539

M

MACHINING
Machining with a round-nosed form tool N81-23457
Compensatory control of form error in machining N81-23459
X-ray diffraction measurement of residual stress (strain): Energy dispersive X-ray residual stress measurement N81-23480
MAGMA
Preliminary analysis of two aspects of magma-powered electric-generation plants
[SAND-80-1522] N81-23687
MAGNET COILS
D-D Tokamak reactor studies
[ANL/FPP/TM-138] N81-23907
MAGNETIC DISTURBANCES
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743
MAGNETIC FIELDS
Magnetic-field effects on photosensitized electron transfer reactions
[LBL-12361] N81-23222
An experimental comparison of pumped superluminal electromagnetic radiation to Cerenkov radiation
[AD-A097571] N81-23361
Prediction techniques for forthcoming solar maxima N81-23536
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743
Evaluation of magnetic helicity in homogeneous turbulence
[NASA-TM-82131] N81-23900
High magnetic field MHD generator program
[DOE/ET-15611/3] N81-23902
MAGNETIC MATERIALS
Atmospheric corrosion resistance of steels prepared from the magnetic fraction of urban refuse
[PB81-148215] N81-23265
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267
MAGNETIC POLES
The estimation of palaeomagnetic pole positions
[AD-A097488] N81-23745
MAGNETIC STARS
Documentation for the machine-readable version of the University of Michigan Catalogue of two-dimensional spectral types for the HD stars. Volume 2: Declinations minus 53 deg to minus 40 deg
[NASA-TM-82285] N81-23985
MAGNETIC STORMS
Solar-geophysical data number 433. Part 2: (Comprehensive Reports) Data for August 1980, July 1980, March 1980, and miscellanea
[PB81-145286] N81-23994
MAGNETIC TAPES
Documentation for the machine-readable version of an atlas of ultraviolet stellar spectra and a second atlas of ultraviolet stellar spectra from OAO 2 observations
[NASA-TM-82284] N81-23984

MAGNETOHYDRODYNAMIC GENERATORS
Preliminary investigation of acoustic oscillations in an H2-O2 fired Hall generator
[NASA-TM-81756] N81-23610
Assessment of disk MHD generators for a base load powerplant
[NASA-TM-82609] N81-23611
High magnetic field MHD generator program
[DOE/ET-15611/3] N81-23902
GPSAP/V2 with applications to open-cycle MHD systems
[ANL/MHD-80-15] N81-23908
MAGNETOHYDRODYNAMIC STABILITY
Plasma instabilities in the electrojets N81-23532
Tensor pressure Tokamak equilibrium and stability
[ORNL/TM-7120] N81-23906
Limiting beta of stellarators with no net current
[PPPL-1738] N81-23913
MAGNETOSPHERE
Magnetospheric and ionospheric flow and the interplanetary magnetic field --- atmospheric effects N81-23510
Ionospheric disturbances of magnetospheric origin N81-23512
On the structures and mapping of auroral electrostatic potentials
[NASA-CR-164336] N81-23741
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743
MAGNETOSPHERIC INSTABILITY
Magnetospheric influences on the ionosphere N81-23511
MAGNETOSPHERIC ION DENSITY
Magnetosphere-Ionosphere coupling through the auroral acceleration region N81-23513
MAGNITUDE
Astronomical programs: A canon of solar eclipses for the years -1500 to -1000
[PB81-133555] N81-23988
MAINE
Advanced system demonstration for utilization of biomass as an energy source. Site study report --- site selection in Maine
[DOE/ET-20055/T1] N81-23662
MAINTENANCE
Cost-effectiveness of countermeasures to intergranular stress corrosion cracking in BWR piping
[EPRI-NP-1703] N81-23252
MALLEABILITY
Thermal analysis of malleable base white iron for quality control N81-23237
MAN MACHINE SYSTEMS
Terms and axioms for a theory of human-machine systems N81-23796
Continuing education through computer-aided instruction
[LA-UR-81-82] N81-23935
MANAGEMENT INFORMATION SYSTEMS
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 1: NDI maintenance data analysis
[AD-A097669] N81-23938
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 2: On-site data collection
[AD-A097670] N81-23939
Portuguese scientific and technical information scene: Present status and future prospects N81-23957
MANAGEMENT PLANNING
NAVAIR Avionics Master Plan
[AD-A097522] N81-23082
Research on parallelism in problem-solving systems
[AD-A097608] N81-23805
Plan for the future of neutron research on condensed matter: An Argonne National report prepared in response to the report of the Review Panel on Neutron Scattering
[ANL-81-5] N81-23878
Survey of solutions to the delivery problems. Growth control of library collections N81-23963
MANGANESE
Availability of copper, nickel, cobalt and manganese from ocean ferromanganese nodules (3)
[PB81-145971] N81-23747
Geological factors related to characteristics of seafloor manganese nodule deposits
[PB81-145831] N81-23758
MANNED SPACE FLIGHT
Aboard the space shuttle
[NASA-EP-169] N81-23179
MANUAL CONTROL
Refinements and validation testing of Human Operator Performance Emulator (HOPE)
[AD-A097449] N81-23793
MANUFACTURING
The establishment of a production-ready manufacturing process utilizing thin silicon substrates for solar cells
[NASA-CR-164327] N81-23615
Financial study of commercialization of solar central receiver power systems
[DOE/SF-11421/1] N81-23640
Solar thermal electric power information user study
[SERI/TR-751-750] N81-23689
MAPPING
An analysis of source structure effects in radio interferometry measurements
[NASA-CR-164285] N81-23344
Automatic methods in image processing and their relevance to map-making
[AD-A097377] N81-23566
On the structures and mapping of auroral electrostatic potentials
[NASA-CR-164336] N81-23741
Effects of surface-mapping corrections and synthetic-aperture focusing techniques on ultrasonic imaging
[EGG-FM-5314] N81-23865
Status and future of extraterrestrial mapping programs
[NASA-CR-3390] N81-23989
MAPS
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549
MARINE METEOROLOGY
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta
[AD-A097429] N81-23774
Comparison of the Marine Index of refraction structure parameter, C2n, model with optical measurements
[AD-A097691] N81-23776
An investigation of marine fog forecast concepts
[AD-A097338] N81-23778
MARINE TECHNOLOGY
Holding capacity of plate anchors
[AD-A097116] N81-23467
MARKET RESEARCH
Studies and experiments by Eurospace in the field of education and public service --- Symphonie and third world countries N81-23154
Analysis of the market and product costs for coal-derived high Btu gas: Staff working paper
[DOE/FE-0011] N81-23319
Market capture by 30/20 GHz satellite systems. Volume 1: Executive summary
[NASA-CR-165231] N81-23345
Market capture by 30/20 GHz satellite systems, volume 2
[NASA-CR-165232] N81-23346
The 30/20 GHz communications system functional requirements
[NASA-CR-165301] N81-23347
Photovoltaics Program Utility Interface Southwest Regional Workshop Proceedings
[NASA-CR-164284] N81-23601
Market study for direct utilization of geothermal resources by selected sectors of economy
[DOE/RA-50108/T1] N81-23631
Development of a market methodology for assessing the impact of solar thermal-produced fuels and chemicals
[DOE/SF-12989/1] N81-23968
MARKETING
Financial study of commercialization of solar central receiver power systems
[DOE/SF-11421/1] N81-23640
Solar thermal electric power information user study
[SERI/TR-751-750] N81-23689
MARKOV PROCESSES
Response of nonlinear mechanical systems to random excitation. Part 1: Markov methods N81-23485
An assessment of Markov renewal models in forecasting international affairs
[AD-A097295] N81-23839
MARS ATMOSPHERE
Discovery of natural gain amplification in the 10 muon m CO2 laser bands on Mars: The first definite natural laser
[NASA-TM-82048] N81-23448
Studies of the role of metastables and doubly ionized species in the chemical and thermal structure of the Venusian and Martian ionospheres
[NASA-CR-164329] N81-23991
MARYLAND
Asbestos analytical programs bulk sample analysis: New York City and Maryland
[PB81-146722] N81-23729
MASS SPECTROMETERS
SUMS preliminary design and data analysis development --- shuttle upper atmosphere mass spectrometer experiment
[NASA-CR-165696] N81-23181
Analytical applications of ion cyclotron resonance mass spectroscopy N81-23201
Multiphoton dissociation spectroscopy and photochemistry
[DOE/ER-10660/1] N81-23225
MASS SPECTROSCOPY
Multiphoton dissociation spectroscopy and photochemistry
[DOE/ER-10660/1] N81-23225
MASS TRANSFER
Relationships of dispersive mass transport and stochastic convective flow through hydrologic systems
[PNL-3302] N81-23428
MATERIALS HANDLING
Design optimization in underground coal systems. Volume 6: LHDSIM: A load-haul-dump simulator for room-and-pillar mining systems
[FE-1231-24-VOL-6] N81-23569
Coal resource information. Volume 1: Coal resource information requirements
[EPRI-EA-673-VOL-1] N81-23571
Asbestos analytical programs bulk sample analysis: New York City and Maryland
[PB81-146722] N81-23729
MATERIALS RECOVERY
Electrolytic reduction of chromium (6) and copper using coke electrodes
[PB81-148249] N81-23263
Experimental processing of salt slags from an aluminum dross furnace
[PB81-135022] N81-23264
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267
Processing equipment for resource recovery systems. Volume 2: Magnetic separators, air classifier and ambient air emissions tests
[PB81-141590] N81-23324
Recovery and separation of products from the high-temperature chlorination of fly ash
[IS-T-947] N81-23723
MATHEMATICAL MODELS
Prediction of the turbulent wake with second-order closure
[NASA-CR-164294] N81-23038
An assessment of theoretical models for viscous and transonic flow N81-23046
MLS: Airplane system modeling
[NASA-CR-165700] N81-23059
Homing missile guidance studies: Observability, adaptability
[AD-A097624] N81-23178
Creep and creep rupture of laminated graphite/epoxy composites
[NASA-CR-164297] N81-23193
Pulverized fuel combustion: Modeling and scaleup mathodologies
[DOE/PC-30294/1] N81-23219

Hydrogen attack of pressure-vessel steel
[DOE/ER-02872/5] N81-23258
Coupled walls in earthquake-resistant buildings, modeling techniques and dynamic analysis
[PB81-132698] N81-23329
Atmospheric optical communication systems
[AD-A097673] N81-23366
Electric utility value determination for wind energy. Volume 2: A user's guide
[SERI/TR-732-604-VOL-2] N81-23394
Experimental studies of partially defluidized bed with immersed heat exchange tubes N81-23407
Fundamental research in turbulent modeling. Part 1: Theory. Part 2: Experiment
[AD-A097431] N81-23425
Next steps in two-phase flow: Executive summary
[DOE/ET-27225/12] N81-23429
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560
Development of a model for estimating the extent of river flooding with satellite and in situ data
[PB81-152035] N81-23588
Models for residential-and commercial-sector energy conservation analysis: Applications, limitations, and future potential
[DOE/PE-70044/T3] N81-23639
Comparison between the SIMPLE and ENERGY mixing models
[DOE/ET-37240/78TR] N81-23703
An airport community noise-impact assessment model
[NASA-TM-80198] N81-23713
Initial validation of an ambient air quality model for Naval air operations
[AD-A097665] N81-23715
Constitutive models for compressive loading of geologic materials
[UCRL-53073] N81-23757
An efficient code for the simulation of nonhydrostatic stratified flow over obstacles
[NASA-CR-3385] N81-23762
The effect of surface boundary conditions on the climate generated by a coarse-mesh general circulation model
[NASA-CR-164296] N81-23765
Air mass considerations in fog optical modeling
[AD-A097609] N81-23772
A human operator gunner model for a tracking task with interrupted observations in an antiaircraft artillery system
[AD-A097360] N81-23803
Simulation analysis of head/neck impact response for helmeted and unhelmeted motorcyclists
[PB81-145377] N81-23804
Bounded error adaptive control, part 1
[AD-A097628] N81-23824
An assessment of Markov renewal models in forecasting international affairs
[AD-A097295] N81-23839
On the degree of inflation of measures of fit induced by empirical model building
[AD-A097536] N81-23856
Continuous model of an unreliable two-stage material flow system with a finite interstage buffer
[PB81-146862] N81-23859
Ion extraction and optics in three dimensions
[ORNL/TM-7691] N81-23899
GPSAP/V2 with applications to open-cycle MHD systems
[ANL/MHD-80-15] N81-23908
Modeling of thin-film GaAs growth
[NASA-CR-164317] N81-23926
The reliability of multistate, multioutput systems N81-24011
New results on antenna arraying, part 1 N81-24012

MATRICES (MATHEMATICS)
Unsteady transonic flow past airfoils in rigid body motion --- predicting aerodynamic forces for flutter analysis
[AD-A097142] N81-23041
Statistical classification techniques for engineering and climatic data samples
[NASA-CR-164337] N81-23764

MAXIMUM ENTROPY METHOD
Maximum entropy image estimation analysis of image formation with thinned random arrays
[AD-A097357] N81-23349

MAXWELL EQUATION
The Hamiltonian structure of the Maxwell-Vlasov Equations
[AD-A097412] N81-23834
Dynamic theory: A new view of space, time, and matter
[LA-8370-MS] N81-23934

MEAN SQUARE VALUES
End-to-end quality measure for transmission of compressed imagery over a noisy coded channel N81-24007

MEASURING INSTRUMENTS
Computer utilization in analytical instrumentation N81-23200

MECHANICAL DRIVES
Traction drive for cryogenic boost pump --- hydrogen oxygen rocket engines
[NASA-TM-81704] N81-23188

MECHANICAL ENGINEERING
Distributed computing for advanced levels of machinery control N81-23458

MECHANICAL PROPERTIES
Composite materials for structural design --- polymer matrix composite materials
[AD-A097297] N81-23195
Mechanical Properties Data Center
[AD-A097389] N81-23945

MECHANICAL SHOCK
The Shock and Vibration Digest, volume 13, no. 4
[AD-A097950] N81-23483

MEDIA
Microscopic approach to transport in two-phase random media N81-23408

MEMBRANES
Hollow-fiber membranes for photosensitized electron transport
[LBL-12359] N81-23220
Kinetics of photosensitized electron transport across a membrane boundary
[LBL-12360] N81-23223

MEMORY
Preliminary study of head-up assessment techniques. 1: Viewing duration of instrument panel and HUD symbology using a recall methodology
[NASA-TM-78517] N81-23798

MENTAL PERFORMANCE
Uncertainty measurement in a complex task as a function of response mode and event type characteristics
[AD-A097678] N81-23792

MERCURY (PLANET)
Status and future of extraterrestrial mapping programs
[NASA-CR-3390] N81-23989

MERCURY CADMIUM TELLURIDES
Defect chemistry and characterization of Hg(1-x)Cd(x)Te
[NASA-CR-161746] N81-23924
Defect chemistry and characterization Hg(1-x)Cd(x)Te
[NASA-CR-161755] N81-23925

MESOSCALE PHENOMENA
Mesoscale variability of the atmospheric wind field below 5 km
[AD-A097414] N81-23773

METAL AIR BATTERIES
Comparison of future battery systems for application to general-purpose electric vehicles
[UCRL-53092] N81-23980

METAL BONDING
Cladding of metals to iron by vacuum rolling
[PB81-150096] N81-23476

METAL CRYSTALS
Materials processing threshold report. 1: Semiconductor crystals for infrared detectors
[NASA-CR-161752] N81-23100

METAL HALIDES
Thermochemistry of gaseous compounds of metals
[AD-A097352] N81-23210

METAL OXIDE SEMICONDUCTORS
A study of flicker noise in MOSFETS
[AD-A097557] N81-23389

METAL PARTICLES
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267

METAL PLATES
Impact and penetration problems
[AD-A097413] N81-23463

METAL SHEETS
Stressed skin action in composite panels comprising steel sheeting and boards
[PB81-135733] N81-23331

METAL STRIPS
Termination of surface acoustic wave velocity and impedance differences between metal strips and free surface regions of metallic gratings
[AD-A097337] N81-23386

METAL SURFACES
Mechanisms of erosion/corrosion of metals and their oxide scales --- coal gasification pilot plant components
[LBL-12023] N81-23255
Characterization of alloys formed by ion implantation
[PB81-148223] N81-23270
The bonding of H to Ni, Pd and Pt surfaces --- photoelectron spectroscopy
[AD-A097361] N81-23276
An experimental study of electronic states at metal dielectric interfaces
[AD-A097363] N81-23929

METAL-METAL BONDING
Study of local atomic and electronic structure in glassy metallic alloys
[DOE/ER-10382/2] N81-23296

METALLIC GLASSES
Study of local atomic and electronic structure in glassy metallic alloys
[DOE/ER-10382/2] N81-23296

METALLIZING
Analysis and evaluation in the production process and equipment area of the low-cost solar array project
[DOE/JPL-954796-81/12] N81-23622

METALLOIDS
Study of local atomic and electronic structure in glassy metallic alloys
[DOE/ER-10382/2] N81-23296

METALLURGY
Thermal analysis of malleable base white iron for quality control N81-23237

METALS
X-ray fluorescence spectrometric analysis of wear metals in used lubricating oils
[AD-A097552] N81-23087
Environmental effects on fatigue behavior of metals
[AD-A097546] N81-23248
Development of analytical reference materials for refuse-derived fuels
[PB81-135030] N81-23323
Mechanical Properties Data Center
[AD-A097389] N81-23945

METASTABLE STATE
Studies of the role of metastables and doubly ionized species in the chemical and thermal structure of the Venusian and Martian ionospheres
[NASA-CR-164329] N81-23991

METEOROLOGICAL CHARTS
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759

METEOROLOGICAL PARAMETERS
On the use of off-nadir pointing for increased temporal resolution of Earth observing satellite systems
[NASA-TM-82139] N81-23175
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, summer, 1978
[AD-A097134] N81-23749
Atmospheric optical propagation comparisons during MAGAT-80
[AD-A097274] N81-23752
RAWINPROC: Computer program for decommutating, interpreting, and interpolating Rawinsonde meteorological balloon sounding data
[NASA-CR-164315] N81-23766
Meteorological and air quality data report. WIPP site: Eddy County, New Mexico --- radioactive waste disposal site selection
[SAND-81-7052] N81-23779

METEOROLOGICAL SATELLITES
Development of infrared and microwave techniques for cloud parameter inference from satellite imagery and sounder data
[AD-A097592] N81-23770

METEOROLOGICAL SERVICES
Evaluation of the Transcribed Weather Broadcast (TWEB) system and alternatives. Volume 2: Cost analyses of the TWEB radio and telephone accessible mass weather dissemination services
[AD-A097567] N81-23769

METEOROLOGY
Electronic flight rules: An alternative separation assurance concept
[AD-A097570] N81-23063
Ionospheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760

METEOSAT SATELLITE
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759

METHANATION
Effects of additives on methanation activity of Raney nickel catalysts
[BM-RI-8487] N81-23217

METHANE
Hydrogen attack of pressure-vessel steel
[DOE/ER-02872/5] N81-23258
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
Review of horizontal drilling technology for methane drainage from U.S. coalbeds
[PB81-148181] N81-23590

METHYL ALCOHOLS
Test and evaluation of methanol in a gas turbine system
[EPRI-AP-1712] N81-23307

METROLOGY
NASA Metrology and Calibration, 1980
[NASA-CP-2174] N81-23432
A basis for traceable NDE measurements
[PB81-145757] N81-23478

MEXICO
Oil and natural gas from Alaska, Canada, and Mexico: Only limited help for US
[EMD-80-72] N81-23552
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta
[AD-A097429] N81-23774

MICHIGAN
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545

MICROBEAMS
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste
[BNL-28668] N81-23228

MICROCOMPUTERS
A microcomputer-based signal data converter for runway visual range measurements
[AD-A097568] N81-23060
The role of microcomputers in trace metal analysis N81-23198

MICROFILMS
Online microfilm recorders of Los Alamos National Laboratory
[LA-UR-81-284] N81-23953

MICROORGANISMS
Microbial deterioration of marine diesel fuel from oil shale
[AD-A097674] N81-23304
Flux of energy and essential elements through the continental shelf ecosystem
[DOE/EV-00639/22] N81-23728
Drag enhancement of microbial slime films on rotating discs
[AD-A097228] N81-23787

MICROPROCESSORS
A microcomputer-based signal data converter for runway visual range measurements
[AD-A097568] N81-23060
Summary of transponder data, May 1979 - November 1979
[AD-A097569] N81-23061
Microprocessor generated vertical gyrohorizon instrument for the Blue Bird simulator
[AD-A097658] N81-23098
Solar heating and cooling system installed at RKL Controls Company, Lumberton, New Jersey
[NASA-CR-161679] N81-23597
Feasibility study of a microprocessor based oculometer system
[NASA-CR-164286] N81-23889

MICROSCOPY
Slime Analysis of painted steel panels immersed in Biscayne Bay, Miami Beach, Florida
[AD-A097229] N81-23280

MICROSTRIP TRANSMISSION LINES
An investigstion of the effects of mutual coupling on the performance of microstrip radiation
[AD-A097556] N81-23383

MICROSTRUCTURE
Microstructural changes following superplastic deformation of commercially pure titanium
[AD-A097277] N81-23247
Hardness tests on irradiated pressure vessel steel
[IS-T-942] N81-23259
Localized corrosion and stress-corrosion cracking behavior of stainless steel weldments
[DOE/ER-02462/T1] N81-23261
Iron-base alloys strengthened by Laves phases as substitutes for stainless steels
[PB81-150153] N81-23268
Effects of internal gas pressure and microstructure on the mechanisms of hot pressing and swelling in ceramics
[COO-2713-5] N81-23293
Microscopic approach to transport in two-phase random media N81-23408
Microstructural effects on the mechanical properties and thermal shock resistance of a high alumina refractory concrete N81-23479
Computer simulation study of the structure of vacancies in grain boundaries
[DOE/ER-05002/15] N81-23931

MICROWAVE AMPLIFIERS
Controlled avalanche transit-time triode amplifiers
[AD-A097439] N81-23390
Satellite Power Systems (SPS) concept definition study (Exhibit D). Volume 7: System/subsystems requirements databook
[NASA-CR-3399] N81-23595

MICROWAVE ANTENNAS
The Symphonie ground stations N81-23107

MICROWAVE EQUIPMENT
S-band microwave system, revision
[AD-A097641] N81-23348
Research and technology developments in aeronautics, atmospheric and oceanographic measurements, radar applications, and remote sensing of insects using radar
[NASA-TM-73289] N81-23996

MICROWAVE IMAGERY
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565

MICROWAVE LANDING SYSTEMS
MLS: Airplane system modeling
[NASA-CR-165700] N81-23059

MICROWAVE RADIOMETERS
ORION: Microwave water vapor radiometer subsystem design N81-24000
Calculation of atmospheric loss from microwave radiometric noise temperature measurements N81-24008

MICROWAVE SPECTROMETERS
Sensitivity and response time improvements in millimeter-wave spectrometers
[LBL-8789] N81-23726

MICROWAVE SWITCHING
Two-wavelength HeNe laser interferometer
[UCID-18988] N81-23456

MICROWAVE TRANSMISSION
Health and safety: Preliminary comparative assessment of the Satellite Power System (SPS) and other energy alternatives
[NASA-CR-164215] N81-23594
Atmospheric microwave refractivity and refraction
[NASA-CR-164339] N81-23739
The CTS 11.7 GHz angle of arrival experiment
[NASA-CR-164338] N81-23740
Development of infrared and microwave techniques for cloud parameter inference from satellite imagery and sounder data
[AD-A097592] N81-23770

MICROWAVES
The use of microwaves to characterize optically stimulated semiconductors N81-23374

MIE SCATTERING
Penetration of solar radiation in snow-ice covered water reservoirs: Winterkill
[PB81-149643] N81-23584

MILITARY OPERATIONS
Challenges and opportunities in Air Forces tactical communications
[AD-A097677] N81-23352
Initial validation of an ambient air quality model for Naval air operations
[AD-A097665] N81-23715

MILLIMETER WAVES
Quasi-optical techniques for millimeter and submillimeter-wave circuits
[AD-A097355] N81-23388
Sensitivity and response time improvements in millimeter-wave spectrometers
[LBL-8789] N81-23726
Atmospheric microwave refractivity and refraction
[NASA-CR-164339] N81-23739
The CTS 11.7 GHz angle of arrival experiment
[NASA-CR-164338] N81-23740

MINERAL DEPOSITS
Flameproof television camera set for the observation of coal seams and rock strata as well as of tectonic surfaces in underground boreholes
[BMFT-FB-T-80-149] N81-23370
Geological factors related to characteristics of seafloor manganese nodule deposits
[PB81-145831] N81-23758

MINERALS
A continuous dielectric separator for mineral beneficiation
[PB81-135014] N81-23581

MINES (EXCAVATIONS)
Controlled burnout of wasted coal on abandoned coal mine lands
[PB81-148231] N81-23234
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550
Design optimization in underground coal systems. Volume 6: LHDSIM: A load-haul-dump simulator for room-and-pillar mining systems
[FE-1231-24-VOL-6] N81-23569
Design optimization in underground coal systems. Volume 3: Structural characterization of coal
[FE-1231-21-VOL-3] N81-23575
Design optimization in underground coal systems. Volume 7: Prediction of mining subsidence and related parameters over longwall mining operations
[FE-1231-25] N81-23576

Shaft design in the Coeur d'Alene Mining District, Idaho: Results of in situ stress and physical property measurements
[PB81-148199] N81-23591

Guide to substation grounding and bonding for mine power systems
[PB81-148264] N81-23592

MINIATURE ELECTRONIC EQUIPMENT
Development of a novel laser material for miniaturized laser systems
[AD-A097477] N81-23451

MINICOMPUTERS
CDC/1000: A Control Data Corporation remote batch terminal emulator for Hewlett-Packard minicomputers
[SAND-80-2548] N81-23811

MINIMUM ENTROPY METHOD
Minimum-cross-entropy spectral analysis of multiple signals
[AD-A097531] N81-23384

MINING
The utilization of nonterrestrial materials --- resources for solar power satellite construction
[NASA-TM-83106] N81-23099

Design optimization in underground coal systems. Volume 6: LHDSIM: A load-haul-dump simulator for room-and-pillar mining systems
[FE-1231-24-VOL-6] N81-23569

Coal resource information. Volume 1: Coal resource information requirements
[EPRI-EA-673-VOL-1] N81-23571

Design optimization in underground coal systems. Volume 9: Modified FACESIM and COST-SCHED programs
[FE-1231-27-VOL-9] N81-23574

Development of a computer-aided method for the techno-economic evaluation of R and D projects in the mining area. Stage 1: Development of the concept and identification of application
[BMFT-FB-T-80-130] N81-23969

MIRROR FUSION
Fusion component design for the moving-ring field-reversed mirror reactor
[UCID-18916] N81-23922

System data structures for on-line distributed data base management system
[UCID-18912] N81-23950

MIRRORS
Advanced solar concentrator: Preliminary and detailed design
[NASA-CR-164316] N81-23623

MISSILE CONTROL
Homing missile guidance studies: Observability, adaptability
[AD-A097624] N81-23178

MISSION PLANNING
Scout/Navy transit improvement program (NOVA-1) launch
[NASA-TM-82350] N81-23177

Solar Terrestrial programs: A five year plan
[NASA-TM-82351] N81-23992

MISSISSIPPI
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785

MIXING
Comparison between the SIMPLE and ENERGY mixing models
[DOE/ET-37240/78TR] N81-23703

MODAL RESPONSE
Investigation of some multiple input/output frequency response function experimental modal analysis techniques N81-23481

MODULES
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604

Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617

MODULUS OF ELASTICITY
Some thoughts on material stability
[AD-A097350] N81-23499

MOLDING MATERIALS
Shape-casting titanium in olivine, garnet, chromite, and zircon rammed and shell molds
[PB81-147274] N81-23475

MOLECULAR ABSORPTION
Atmospheric optical propagation comparisons during MAGAT-80
[AD-A097274] N81-23752

MOLECULAR BEAM EPITAXY
Development of polycrystal GaAs solar cells
[SERI/PR-8032-1-T1] N81-23660

MOLECULAR ENERGY LEVELS
Intramolecular flexibility of relatively rigid polymers, and intermolecular interactions in ordered polymer systems, part 2
[AD-A097424] N81-23284

MOLECULAR INTERACTIONS
Intramolecular flexibility of relatively rigid polymers, and intermolecular interactions in ordered polymer systems, part 2
[AD-A097424] N81-23284

MOLECULAR RELAXATION
Infrared hole - Burning spectroscopy of matrix isolated ReO4(-) molecules N81-23447

MOLECULAR STRUCTURE
Threshold tear strength of some molecular networks --- high temperatures and polymers
[AD-A097232] N81-23283

New type of metallo-organic polymer: Bimetalloporphyrins. Investigating a new chemistry of metallophthalocyanines
[AD-A097447] N81-23286

MOLTEN SALT ELECTROLYTES
Molten carbonate fuel cell system verification and scale-up
[EPRI-EM-1481] N81-23651

Molten carbonate fuel cell large stack development
[PB81-145930] N81-23708

MOLTEN SALTS
Molten salt coal gasification process development unit, phase 2
[DOE/ET-10296/70] N81-23310

MOLYBDENUM
Gaseous sulfidation of pure molybdenum at 700 deg - 950 deg C N81-23239

Iron-base alloys strengthened by Laves phases as substitutes for stainless steels
[PB81-150153] N81-23268

Test methods and results of a study of greases for use in roto-launch valve lubrication
[AD-A097565] N81-23289

MOLYBDENUM SULFIDES
Gaseous sulfidation of pure molybdenum at 700 deg - 950 deg C N81-23239

MOMENTS
A hybrid method which combines a moment method current with an asymptotic current N81-23377

MONITORS
Survey of hydrogen monitoring devices
[UCRL-84164] N81-23444

MONOPULSE RADAR
A comparison of monopulse and interferometric systems
[AD-A097656] N81-23364

MONTANA
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550

MONTE CARLO METHOD
Monte Carlo simulation of an ac tual segmented calorimeter: A study of calorimeter performance at high energies
[ORNL/TM-7123] N81-23443

A Monte Carlo study of AR(1) estimators under several performance criteria
[AD-A097533] N81-23853

MOORING
Holding capacity of plate anchors
[AD-A097116] N81-23467

MORPHOLOGY
On the morphology of the polar thermosphere N81-23528

MOTION SIMULATORS
A motion cycle simulator for analysis and optimization of human power N81-23797

MOTOR VEHICLES
Simulation analysis of head/neck impact response for helmeted and unhelmeted motorcyclists
[PB81-145377] N81-23804

MULTIPLEXING
Digital transmission tests of multiplexed video and audio signals at 60 Mbit/s via Orbital Test Satellite (OTS)
[BBC-RD-1980/16] N81-23342

A study of integrated switching techniques --- voice/data multiplexers
[AD-A097243] N81-23806

Wavelength division multiplexing: Overview of the state of the art
[AD-A097587] N81-23898

MULTIPROCESSING (COMPUTERS)
Distributed computing for advanced levels of machinery control N81-23458

Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818

MULTISPECTRAL PHOTOGRAPHY
Modeling misregistration and related effects on multispectral classification
[NASA-CR-164282] N81-23563

MULTIVARIATE STATISTICAL ANALYSIS
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

A new proof of admissibility of tests in the multivariate analysis of variance
[AD-A097110] N81-23840

Multiple objective evaluation and choicemaking under risk with partial preference infomation
[AD-A097418] N81-23941

MUONS
Virtual photoproduction of hidden and open charm
[LBL-11844] N81-23870

MUSCLES
A motion cycle simulator for analysis and optimization of human power N81-23797

MUTATIONS
Bioassay of polycyclic aromatic hydrocarbons
[DOE/EV-04477/T2] N81-23677

N

N-N JUNCTIONS
Analysis of an nn+ low-high junction and the application to integrated injection logic devices N81-23375

N-TYPE SEMICONDUCTORS
Radioisotope space power generator
[GA-A-15683] N81-23638

NASA PROGRAMS
An evaluation of NASA's program for advancing rotorcraft technology
[PB81-144180] N81-23078

National Aeronautics and Space Administration Authorization Act, 1982
[H-REPT-97-32] N81-23971

Authorizing appropriations to the National Aeronautics and Space Administration for fiscal year 1982
[H-REPT-97-32] N81-23972

National Aeronautics and Space Administration Authorization Act, 1982
[S-REPT-97-100] N81-23973

Solar Terrestrial programs: A five year plan
[NASA-TM-82351] N81-23992

Research and technology developments in aeronautics, atmospheric and oceanographic measurements, radar applications, and remote sensing of insects using radar
[NASA-TM-73289] N81-23996

NASTRAN
A comparison of laboratory measured temperatures with predictions for a spar/skin type aircraft structure
[NASA-TM-81359] N81-23067

NATURAL GAS
Oil and natural gas from Alaska, Canada, and Mexico: Only limited help for US
[EMD-80-72] N81-23552

Helium resources of the United States, 1979
[PB81-150146] N81-23582

Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon
[PB81-151995] N81-23587

Short-term energy outlook. Volume 2: Methodology
[DOE/EIA-0202/4-VOL-2] N81-23654

NAVIER-STOKES EQUATION
Calculation of two-dimensional inlet flow fields by an implicit method including viscous effects: User's manual
[NASA-CR-3412] N81-23027
Analysis of turbulent flow about an isolated airfoil using a time dependent Navier-Stokes procedure N81-23053
NAVIGATION AIDS
Navaids calibration evaluation with a computer-controlled avionics data acquisition system N81-23020
Functional testing airborne navigation equipment [AD-A097115] N81-23062
Sensor image prediction techniques [AD-A097638] N81-23895
NAVIGATION INSTRUMENTS
Functional testing airborne navigation equipment [AD-A097115] N81-23062
NAVIGATION SATELLITES
Scout/Navy transit improvement program (NOVA-1) launch
[NASA-TM-82350] N81-23177
NAVY
NAVAIR Avionics Master Plan
[AD-A097522] N81-23082
NEAR WAKES
Mean-flow and turbulence measurements in the vicinity of the trailing edge of an NACA (63 sub 1)-012 airfoil
[NASA-TP-1845] N81-23410
NEBRASKA
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
NECK (ANATOMY)
Tolerance of the head and neck to -G sub x inertial loading of the head
[AD-A097632] N81-23789
Simulation analysis of head/neck impact response for helmeted and unhelmeted motorcyclists
[PB81-145377] N81-23804
NEODYMIUM LASERS
Development of a novel laser material for miniaturized laser systems
[AD-A097477] N81-23451
NEPHELOMETERS
Airborne measurement of aerosol size distributions over northern Europe. Volume 1: Spring and fall 1976, summer 1977
[AD-A097090] N81-23750
NETWORK ANALYSIS
Some results on the overall reliability of undirected graphs
[AD-A097445] N81-23832
Second derivative algorithms for minimum delay distributed routing in networks
[AD-A097623] N81-23835
Formulation of nonlinear network equations using topological potential functions N81-23860
NETWORK CONTROL
Challenges and opportunities in Air Forces tactical communications
[AD-A097677] N81-23352
GRIDNET
[PB81-144370] N81-23372
NEUTRAL PARTICLES
Neutral winds in the polar ionosphere N81-23519
Thermospheric neutral composition changes and their causes N81-23524
NEUTRON PHYSICS
Plan for the future of neutron research on condensed matter: An Argonne National report prepared in response to the report of the Review Panel on Neutron Scattering
[ANL-81-5] N81-23878
NEUTRON SCATTERING
Instrument development for materials science research at WNR
[LA-UR-80-2969] N81-23442
Plan for the future of neutron research on condensed matter: An Argonne National report prepared in response to the report of the Review Panel on Neutron Scattering
[ANL-81-5] N81-23878
NEUTRON SOURCES
Instrument development for materials science research at WNR
[LA-UR-80-2969] N81-23442
Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909
NEUTRON SPECTRA
Method for sampling from fission neutron energy spectra
[ORNL/TM-7631] N81-23884
NEVADA
Wind energy resource atlas. Volume 9: The Southwest region --- Nevada and California
[PNL-3195WERA-9-VOL-9] N81-23634
Nevada nuclear waste storage investigations
[NVO-196-20] N81-23881
NEW MEXICO
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550
Direct application of geothermal energy at the L'eggs Product Plant, Las Cruses, New Mexico
[DOE/ID-12047/3] N81-23636
Meteorological and air quality data report. WIPP site: Eddy County, New Mexico --- radioactive waste disposal site selection
[SAND-81-7052] N81-23779
NEW YORK
Ethanol production in northern New York: Technical and economic feasibility
[PB81-144438] N81-23322
Development of a model for estimating the extent of river flooding with satellite and in situ data
[PB81-152035] N81-23588
Asbestos analytical programs bulk sample analysis: New York City and Maryland
[PB81-146722] N81-23729
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780
NEWS MEDIA
Telecommunications services for special events --- Symphonie applications N81-23160
NEWTON-RAPHSON METHOD
Maximum entropy image estimation analysis of image formation with thinned random arrays
[AD-A097357] N81-23349
NICKEL
Materials for high-temperature hydrogen fluorine environments
[AD-A097426] N81-23190
Effects of additives on methanation activity of Raney nickel catalysts
[BM-RI-8487] N81-23217
The bonding of H to Ni, Pd and Pt surfaces --- photoelectron spectroscopy
[AD-A097361] N81-23276
Availability of copper, nickel, cobalt and manganese from ocean ferromanganese nodules (3)
[PB81-145971] N81-23747
NICKEL ALLOYS
The fracture morphology of nickel-base superalloys tested in fatigue and creep-fatigue at 650 C
[NASA-TM-81740] N81-23244
Synergistic erosion/corrosion of superalloys in PFB coal combustor effluent
[NASA-TM-81715] N81-23245
High temperature low cycle fatigue data for three high strength nickel-base superalloys
[AD-A097430] N81-23246
NICKEL HYDROGEN BATTERIES
Assessment of nickel-hydrogen batteries for terrestrial solar applications
[SAND-80-7191] N81-23706
NICKEL OXIDES
Solid-state displacement reactions between iron and nickel oxide at 1000 C N81-23240
NICKEL ZINC BATTERIES
Response of nickel to zinc cells to electric vehicle chopper discharge waveforms
[NASA-TM-81713] N81-23608
NIGHT
Dynamics of the dayside cusp aurora N81-23533
NITRIC OXIDE
Flaw growth of 6Al-4V STA titanium in nitrogen tetroxide with low nitric oxide content
[NASA-CR-160945] N81-23242
Quantitative absorption and fluorescence studies of NO between 1060 and 2000 A
[NASA-CR-164340] N81-23867
NITRIDES
Materials for high-temperature hydrogen fluorine environments
[AD-A097426] N81-23190
NITROGEN
Chemical diffusion on solid surfaces
[COO-4220-4] N81-23224
Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon
[PB81-151995] N81-23587
NITROGEN COMPOUNDS
Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226
Fundamental synthetic fuel stability study
[DOE/BC-10045/12] N81-23316
NITROGEN TETROXIDE
Flaw growth of 6Al-4V STA titanium in nitrogen tetroxide with low nitric oxide content
[NASA-CR-160945] N81-23242
NOAA SATELLITES
NOAA Meteorology Laboratory support to the Environmental Protection Agency
[PB81-149072] N81-23732
NODULES
Availability of copper, nickel, cobalt and manganese from ocean ferromanganese nodules (3)
[PB81-145971] N81-23747
Geological factors related to characteristics of seafloor manganese nodule deposits
[PB81-145831] N81-23758
NOISE GENERATORS
Trailing edge wake flow characteristics of upper surface blown configurations --- noise generators
[NASA-CR-152224] N81-23028
NOISE POLLUTION
Cumulative annoyance due to multiple aircraft flyover with differing peak noise levels
[NASA-CR-3417] N81-23712
An airport community noise-impact assessment model
[NASA-TM-80198] N81-23713
NOISE PROPAGATION
A study of the effect of terrain on helicopter noise propagation by acoustical modeling
[AD-A097626] N81-23864
NOISE REDUCTION
Laboratory investigation of water-lubricated elastomeric bearings
[AD-A097109] N81-23464
A study of poultry processing plant noise control techniques
[NASA-CR-164291] N81-23863
NOISE SPECTRA
Theory of flux-flow voltage noise in type II superconductors
[IS-T-935] N81-23398
NOISE TEMPERATURE
Calculation of atmospheric loss from microwave radiometric noise temperature measurements N81-24008
NONDESTRUCTIVE TESTS
Development of nondestructive evaluation techniques for high-temperature ceramic heat exchanger components
[ANL-80-123] N81-23292
A basis for traceable NDE measurements
[PB81-145757] N81-23478
NONLINEAR EQUATIONS
Existence and uniqueness of solutions to a class of nonlinear-operator-differential equations arising in automated spaceship navigation
[NASA-TP-1860] N81-23182

Methods and formulas for determining the integral nonlinearity of solid-state amplifiers N81-23379
GPSAP/V2 with applications to open-cycle MHD systems
[ANL/MHD-80-15] N81-23908

NONLINEAR EVOLUTION EQUATIONS
Controllability for distributed bilinear systems
[AD-A097411] N81-23828

NONLINEAR PROGRAMMING
Selection of secondary keys and indices for a database N81-23943

NONLINEAR SYSTEMS
A nonlinear propulsion system simulation tehnique for piloted simulators
[NASA-TM-82600] N81-23085
Response of nonlinear mechanical systems to random excitation. Part 1: Markov methods N81-23485
Controllability for distributed bilinear systems
[AD-A097411] N81-23828
The stability of second order quadratic differential equations, part 3
[AD-A097627] N81-23831
Formulation of nonlinear network equations using topological potential functions N81-23860

NONLINEARITY
A nonlinear analysis of liquid sloshing in rigid containers
[PB81-135204] N81-23430

NONPARAMETRIC STATISTICS
Signal processing in an uncertain environment: Multivariate techniques of nonparametric and robust detection N81-23336
A goodness-of-fit test based on spacings
[AD-A097613] N81-23851

NORTH DAKOTA
Evaluation of hydrothermal resources of North Dakota, phase 1
[DOE/ID-12030/12] N81-23568

NOTCH STRENGTH
Impacted notch bend specimen --- aluminum alloys
[AD-A097131] N81-23495

NOZZLE DESIGN
An analytical procedure and automated computer code used to design model nozzles which meet MSFC base pressure similarity parameter criteria --- space shuttle
[NASA-CR-161757] N81-23187

NOZZLE FLOW
Investigation of the interaction of lift jets and a ground plane --- wall jet radial momentum flux from rectangular nozzles
[NASA-CR-152343] N81-23026

NUCLEAR FISSION
Method for sampling from fission neutron energy spectra
[ORNL/TM-7631] N81-23884

NUCLEAR FUELS
Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905

NUCLEAR FUSION
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692

NUCLEAR PHYSICS
Dynamic theory: A new view of space, time, and matter
[LA-8370-MS] N81-23934

NUCLEAR POWER PLANTS
Impact of operational experience on research and development --- nuclear power plants
[EPRI-NP-1689-SR] N81-23397
International energy indicators
[DOE/IA-0010/8] N81-23655
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Comparing energy technology alternatives from an environmental perspective
[DOE/EV-0109] N81-23688
US central station nuclear electric generating units: Significant milestones, status as of October 1, 1980
[DOE/NE-0030/4(80)] N81-23700

NUCLEAR REACTIONS
Dissipation and diffusion in nuclear fission
[LA-UR-81-301] N81-23883

NUCLEATION
Hydrogen attack of pressure-vessel steel
[DOE/ER-02872/5] N81-23258

NUCLEON-NUCLEON INTERACTIONS
Theoretical implications on ISABELLE physics --- proton, neutron, and annihilation reactions
[BNL-28825] N81-23916

NUMERICAL ANALYSIS
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227
Analysis of an nn+ low-high junction and the application to integrated injection logic devices N81-23375
An experimental and numerical comparison of turbulent flow over a step
[AD-A097141] N81-23420
A numerical treatment of the dynamic motion of a zero bending rigidity cylinder in a viscous stream
[AD-A097450] N81-23426
Application of holography to the study of helicopter rotor flow fields
[NASA-CR-164293] N81-23433
A single-expression formula for inverting strain-life and stress-strain relationships
[NASA-CR-165347] N81-23491
Numerical techniques for lattice gauge theories
[BNL-29048] N81-23932

NUMERICAL CONTROL
Analytic model and numerical simulation of shock wave propagation into a reentrant corner
[AD-A097471] N81-23423
Distributed computing for advanced levels of machinery control N81-23458
Multi-rate digital control systems with simulation applications. Volume 1: Technical report
[AD-A097549] N81-23825
Multi-rate digital control systems with simulation applications. Volume 2: Computer algorithms
[AD-A097550] N81-23826

NUMERICAL STABILITY
The stability of second order quadratic differential equations, part 3
[AD-A097627] N81-23831

O

OATS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

OCEAN BOTTOM
Holding capacity of plate anchors
[AD-A097116] N81-23467
Availability of copper, nickel, cobalt and manganese from ocean ferromanganese nodules (3)
[PB81-145971] N81-23747
Geological factors related to characteristics of seafloor manganese nodule deposits
[PB81-145831] N81-23758
A feasibility study for a versatile deep sea, multileg, stable, cable array
[AD-A097672] N81-23782

OCEAN DATA ACQUISITIONS SYSTEMS
The oceanographic environmental reference service retrieval program users guide
[AD-A097340] N81-23947

OCEAN SURFACE
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759
Comparison of the Marine Index of refraction structure parameter, C2n, model with optical measurements
[AD-A097691] N81-23776
Physical environment of the Eastern Bering Sea, March 1979
[PB81-148496] N81-23786

OCEAN THERMAL ENERGY CONVERSION
The 100 MWe OTEC alternate power systems. Volume 2: Appendices
[ORO-1473-T1-VOL-2-1] N81-23392
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
Physical oceanographic data from the OTEC Punta Tuna, Puerto Rico site, September 1979 - June 1980
[LBL-12327] N81-23784

OCEANOGRAPHY
A feasibility study for a versatile deep sea, multileg, stable, cable array
[AD-A097672] N81-23782
Feasibility of large scale deliberate tracer release experiments in or below the oceanic thermocline
[DOE/EV-10038/1] N81-23783
Physical oceanographic data from the OTEC Punta Tuna, Puerto Rico site, September 1979 - June 1980
[LBL-12327] N81-23784
The oceanographic environmental reference service retrieval program users guide
[AD-A097340] N81-23947

OCULOMETERS
Feasibility study of a microprocessor based oculometer system
[NASA-CR-164286] N81-23889

OFFSHORE ENERGY SOURCES
Long-term measurements of ground motions offshore
[SAND-80-2718C] N81-23756

OFFSHORE PLATFORMS
The 100 MWe OTEC alternate power systems. Volume 2: Appendices
[ORO-1473-T1-VOL-2-1] N81-23392

OIL FIELDS
Testing geopressured geothermal reservoirs in existing wells
[DOE/ET-27081/2] N81-23570

OIL RECOVERY
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary
[SAN-0307-1-VOL-1] N81-23671
Solar Thermal Enhanced Oil Recovery (STEOR), volume 2, sections 2-8
[SAN-0307-1-VOL-2] N81-23672
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 2: Appendices
[SAN-0307-1-VOL-2-APP] N81-23673
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility
[SAN-0307-1-VOL-3] N81-23674
Midtemperature solar systems test facility predictions for thermal performance based on test data: Solar kinetics T-600 solar collector with FEK 244 reflector surface
[SAND-80-1964/9] N81-23675
Solar enhanced oil recovery: A potential early market for industrial solar energy
[SAND-80-1869C] N81-23702

OKLAHOMA
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

OMEGA NAVIGATION SYSTEM
Experimental validation of the ONSOD Omega prediction method N81-23540

ON-LINE SYSTEMS
Portuguese scientific and technical information scene: Present status and future prospects N81-23957
Euronet and its interlinking to other networks N81-23958
Use of external information services N81-23960
ARIANE: Building data bank N81-23961
Introduction of on-line searching in information services N81-23962
Survey of solutions to the delivery problems. Growth control of library collections N81-23963
Library records: In-house file creation versus external services N81-23964

ONBOARD DATA PROCESSING
Relationships for a flight performance computer N81-23014
ONBOARD EQUIPMENT
Thermal control of Symphonie N81-23166
OPALESCENCE
Elastic scattering of polarized deuterons from hydrogen at 2.0, 1.6, and 1.2 GeV and search for critical opalescence in elastic scattering of protons from carbon-12 at 800 MeV
[LA-8662-T] N81-23872
OPEN CIRCUIT VOLTAGE
The effect of minority carrier mobility variations on solar cell spectral response
[NASA-TM-82604] N81-23625
OPERATING TEMPERATURE
Calculated operating temperatures of thermally insulated electric cables
[PB81-145781] N81-23400
OPERATIONAL PROBLEMS
Summary of operating experience with the Symphonie satellites N81-23150
Impact of operational experience on research and development --- nuclear power plants
[EPRI-NP-1689-SR] N81-23397
OPERATIONS RESEARCH
Public service. Panel discussion D --- Telecommunications and Symphonie satellites N81-23161
OPERATOR PERFORMANCE
A human operator gunner model for a tracking task with interrupted observations in an antiaircraft artillery system
[AD-A097360] N81-23803
OPTICAL COMMUNICATION
Atmospheric optical communication systems
[AD-A097673] N81-23366
Wavelength division multiplexing: Overview of the state of the art
[AD-A097587] N81-23896
Maximizing throughput over an average-power-limited and band-limited optical pulse position modulation channel N81-24009
OPTICAL COUPLING
Novel passive and active optical devices in waveguide structures N81-23887
OPTICAL DATA PROCESSING
Studies in digital optical processing N81-23886
OPTICAL EQUIPMENT
Polyurethane fan-out waveguide arrays and computer simulation to control crosstalk in imaging arrays N81-23340
Advanced wavefront sensor concepts
[AD-A097187] N81-23391
OPTICAL FILTERS
Thick phase holograms
[AD-A097201] N81-23436
OPTICAL PROPERTIES
The use of microwaves to characterize optically stimulated semiconductors N81-23374
Combined radiation and conduction in a nongray participating medium that absorbs, emits, and anisotropically scatters N81-23406
Air mass considerations in fog optical modeling
[AD-A097609] N81-23772
High precision fiber development
[AD-A097444] N81-23891
Ion extraction and optics in three dimensions
[ORNL/TM-7691] N81-23899
OPTICAL RADAR
Feasibility study of satellite-borne lidar global wind monitoring system, part 2
[PB81-145369] N81-23781
OPTICAL TRACKING
A human operator gunner model for a tracking task with interrupted observations in an antiaircraft artillery system
[AD-A097360] N81-23803
OPTICAL WAVEGUIDES
Polyurethane fan-out waveguide arrays and computer simulation to control crosstalk in imaging arrays N81-23340
Novel passive and active optical devices in waveguide structures N81-23887
OPTIMIZATION
An analysis of opportunistic maintenance policy for the F100PW100 aircraft engine
[AD-A097548] N81-23025
Detection thresholds for multitarget tracking in clutter
[AD-A097188] N81-23350
Design optimization in underground coal systems. Volume 3: Structural characterization of coal
[FE-1231-21-VOL-3] N81-23575
An algorithm for the rapid location of an extreme of a function subject only to geometric restrictions
[NASA-CR-160940] N81-23812
Binary integer linear programming: A hybrid implicit enumeration approach
[AD-A097108] N81-23817
QP-based methods for large-scale nonlinearly constrained optimization
[AD-A097407] N81-23830
Second derivative algorithms for minimum delay distributed routing in networks
[AD-A097623] N81-23835
Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909
A cost function for an airframe production program
[AD-A097540] N81-23967
OPTIONS
Policy options for the transportation-air-quality process
[PB81-150914] N81-23737
ORBIT CALCULATION
Symphonie orbit: Determination and orbit; manoeuvre activities N81-23147
OREGON
Oregon-based activities in support of the Basalt Waste Isolation Project
[RHO-BWI-SA-42] N81-23880
ORGANIC COMPOUNDS
Studies of the photoelectrochemistry of organic dyes using attenuated total reflection techniques
[DOE/ER-10632/1] N81-23213
Fundamental synthetic fuel stability study
[DOE/BC-10045/12] N81-23316
Method for analysis of organic compounds in the Great Lakes
[PB81-149783] N81-23578
ORGANIC WASTES (FUEL CONVERSION)
Illinois biomass resources. Annual crops and residues; canning and food-processing wastes, preliminary assessment
[ANL/EMR-6] N81-23573
ORGANOMETALLIC COMPOUNDS
New type of metallo-organic polymer: Bimetalloporphyrins. Investigating a new chemistry of metallophthalocyanines
[AD-A097447] N81-23286
ORGANOMETALLIC POLYMERS
Synthesis and properties of highly conducting derivatives of polyacetylene, polyparaphenyleneand graphite N81-23274
ORION (RADIO INTERFEROMETRY NETWORK)
A frequency and timing subsystem for the ORION mobile unit N81-23999
ORION: Microwave water vapor radiometer subsystem design N81-24000
ORTHOTROPISM
Extension of oblique incidence method to photo-orthotropic-elasticity
[NASA-CR-164334] N81-23492
OSCILLATING FLOW
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056
OSCILLATIONS
Preliminary investigation of acoustic oscillations in an H2-O2 fired Hall generator
[NASA-TM-81756] N81-23610
Sausage mode of a pinched charged particle beam
[UCID-18940] N81-23885
OSCILLATORS
The 403 MHz SAW oscillator
[AD-A097675] N81-23387
OTS (ESA)
Stationkeeping experience with OTS N81-23143
Digital transmission tests of multiplexed video and audio signals at 60 Mbit/s via Orbital Test Satellite (OTS)
[BBC-RD-1980/16] N81-23342
OUTPUT
Investigation of some multiple input/output frequency response function experimental modal analysis techniques N81-23481
OXIDATION
Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211
OXIDATION RESISTANCE
Iron-base alloys strengthened by Laves phases as substitutes for stainless steels
[PB81-150153] N81-23268
OXIDATION-REDUCTION REACTIONS
Design, fabrication, and bench testing of a solar chemical receiver
[NASA-CR-164333] N81-23620
OXIDES
Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226
OXIDIZERS
Heat sterilizable solid-propellant development
[NASA-CR-164281] N81-23300
OXYGEN
Alteration of the response of the electron capture detector by addition of oxygen to the carrier gas N81-23202
OXYGEN IONS
Energetic 0-positive precipitation: A significant energy N81-23527
OZONE
Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226
Assessing the representativeness of ozone monitoring data
[PB81-146995] N81-23730
NOAA Meteorology Laboratory support to the Environmental Protection Agency
[PB81-149072] N81-23732
Solar extinction radiometry
[NASA-CR-164290] N81-23993

P

P-TYPE SEMICONDUCTORS
Radioisotope space power generator
[GA-A-15683] N81-23638
PACIFIC OCEAN
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta
[AD-A097429] N81-23774
Tropical cyclone forecast verification as a function of reconnaissance platform
[AD-A097454] N81-23775
PACKAGING
Highly mobile Earth stations --- Antenna design and packaging N81-23139
PACKET SWITCHING
Challenges and opportunities in Air Forces tactical communications
[AD-A097677] N81-23352
Euronet and its interlinking to other networks N81-23958
PACKET TRANSMISSION
GRIDNET
[PB81-144370] N81-23372
PAINTS
Slime Analysis of painted steel panels immersed in Biscayne Bay, Miami Beach, Florida
[AD-A097229] N81-23280
Development of a water displacing, touch-up paint
[AD-A097125] N81-23288
PALEOMAGNETISM
The estimation of palaeomagnetic pole positions
[AD-A097488] N81-23745
PALLADIUM
The bonding of H to Ni, Pd and Pt surfaces --- photoelectron spectroscopy
[AD-A097361] N81-23276
PANEL FLUTTER
An assessment of theoretical models for viscous and transonic flow N81-23046
PARABOLIC REFLECTORS
Assessment of existing studies of wind loading on solar collectors
[SERI/TR-632-812] N81-23501
Wind loading on tracking and field-mounted solar collectors
[SERI/TP-632-958] N81-23502

Advanced solar concentrator: Preliminary and detailed design
[NASA-CR-164316] N81-23623

PARABOLOID MIRRORS
Advanced solar concentrator: Executive summary
[NASA-CR-164318] N81-23624

PARALLEL PLATES
Investigation of heat transfer in straight and curved rectangular ducts
[AD-A097368] N81-23422

PARALLEL PROCESSING (COMPUTERS)
A difference in efficiency between synchronous and asynchronous systems
[AD-A097476] N81-23381

PARALLEL PROGRAMMING
Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818

PARAMETER IDENTIFICATION
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T3] N81-23468
High-reliability gas turbine combined-cycle development program. Phase 1: Summary
[EPRI-AP-1681-SU] N81-23471
High-reliability gas turbine combined-cycle development program, phase 1, volume 2
[EPRI-AP-1681-VOL-2] N81-23472

PARAMETERIZATION
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

PARTIAL PRESSURE
Partial pressures of gaseous HCl and H2O over aqueous solutions of HCl, AlCl3, and FeCl3
[PB81-147381] N81-23232

PARTICLE BEAMS
Sausage mode of a pinched charged particle beam
[UCID-18940] N81-23885
Plasmas in particle accelerators: Adiabatic theories for bunched beams
[UCID-18947] N81-23920

PARTICLE COLLISIONS
High-energy hadron-hadron collisions
[DOE/ER-00946/T1] N81-23877

PARTICLE FLUX DENSITY
Synchrotron emissivity from mildly relativistic particles
[NASA-CR-164335] N81-23868

PARTICLE INTERACTIONS
Interaction of slow electrons with high-pressure gases (quasi-liquids): Synthesis of our knowledge on slow electron-molecule interactions
[DOE/EV-04703/T1] N81-23875

PARTICLE MOTION
Dissipation and diffusion in nuclear fission
[LA-UR-81-301] N81-23883
Particle simulation code for longitudinal dynamics of heavy ion beams
[LBL-12205] N81-23910

PARTICLE PRECIPITATION
Energetic particle precipitation at middle and low latitudes N81-23526
Energetic 0-positive precipitation: A significant energy N81-23527

PARTICLE PRODUCTION
Virtual photoproduction of hidden and open charm
[LBL-11844] N81-23870

PARTICLE SIZE DISTRIBUTION
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T2] N81-23460
Airborne measurement of aerosol size distributions over northern Europe. Volume 1: Spring and fall 1976, summer 1977
[AD-A097090] N81-23750

PARTICLE SPIN
Three-body helicity formalism applied to pion-deuteron scattering
[DOE/ER-05223/31] N81-23874

PARTICLES
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227

PATTERN RECOGNITION
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553
Basic research planning in mathematical pattern recognition and image analysis
[NASA-CR-160946] N81-23561
Data collection analysis and test
[AD-A097160] N81-23948

PATTERN REGISTRATION
Modeling misregistration and related effects on multispectral classification
[NASA-CR-164282] N81-23563

PAVEMENTS
National runway friction measurement program
[AD-A097334] N81-23097
Improving the distribution and reducing the magnitude of pavement damage
[PB81-145864] N81-23333

PELLETS
Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905

PENETROMETERS
In-situ measurement of soil properties
[PB81-130064] N81-23328

PENINSULAS
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545

PERCUSSION
Development of a gasless pyrotechnic cap
[AD-A097197] N81-23301

PERFORMANCE PREDICTION
Performance of high resistivity n+pp+ silicon solar cells under 1 MeV electron irradiation
[NASA-TM-82610] N81-23626
Study of a temperature-stabilized heat pipe system with electrical feedback
[IKE-5-196] N81-23649
Solar energy systems: Standards for cover plates for flat plate solar collectors
[PB81-147290] N81-23709

PERFORMANCE TESTS
Functional testing airborne navigation equipment
[AD-A097115] N81-23062
Test and evaluation of methanol in a gas turbine system
[EPRI-AP-1712] N81-23307
Functional testing airborne radars
[AD-A097562] N81-23358
Monte Carlo simulation of an ac tual segmented calorimeter: A study of calorimeter performance at high energies
[ORNL/TM-7123] N81-23443
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604
Design, fabrication, and bench testing of a solar chemical receiver
[NASA-CR-164333] N81-23620
Molten carbonate fuel cell system verification and scale-up
[EPRI-EM-1481] N81-23651
Research and development of a 3 MW power plant from the design, development, and demonstration of a 100 KW power system utilizing the direct contact heat exchanger concept for geothermal brine recovery project
[DOE/ET-28456/T1] N81-23656
Midtemperature solar systems test facility predictions for thermal performance based on test data: Solar kinetics T-600 solar collector with FEK 244 reflector surface
[SAND-80-1964/9] N81-23675
Block 5 solar cell module: Design and test specification for intermediate-load applications, 1981
[DOE/CS-31037/T1] N81-23693
Rockwell-Rocketdyne flywhell test results
[Y/DX-244] N81-23697

PERIODIC VARIATIONS
The day-by-day variability of the ionospheric peak density N81-23539

PERIODICALS
The Shock and Vibration Digest, volume 13, no. 4
[AD-A097950] N81-23483

PERMAFROST
Building under cold climates and on permafrost. Collection of papers from a US-Soviet Joint Seminar
[AD-A097516] N81-23327

PERMITTIVITY
A continuous dielectric separator for mineral beneficiation
[PB81-135014] N81-23581

PERTURBATION
A summary of rocket-induced ionospheric perturbations N81-23522

PERTURBATION THEORY
The acousto-optic interaction in an infinite slab of isotropic material
[AD-A097202] N81-23892

PHASE COHERENCE
Interference cancellation in self-cohering arrays N81-23337

PHASE CONJUGATION
Ultraviolet phase conjugation and its practical implications --- laser applications
[LA-UR-81-145] N81-23898

PHASE ERROR
Carrier frequency stability and its effect on phase shift keying signals in the satellite channel --- Symphonie satellite N81-23123
The 34-meter antenna-subreflector translations to maximize RF gain N81-24013

PHASE LOCKED SYSTEMS
Experiments with a long time delay phase-locked loop via the satellite Symphonie N81-23124
Optimum design of hybrid phase locked loops N81-24010
New results on antenna arraying, part 1 N81-24012

PHASE SHIFT
Two-wavelength HeNe laser interferometer
[UCID-18988] N81-23456

PHASE SHIFT KEYING
Digital communication multiple access scheme --- using Symphonie N81-23116
Carrier frequency stability and its effect on phase shift keying signals in the satellite channel --- Symphonie satellite N81-23123

PHASED ARRAYS
Immittance properties of large finite dielectric covered phased arrays N81-23341
Phase synchronizing, a nonrigid, distribution transmit-receive radar antenna array
[AD-A097486] N81-23359

PHENOLOGY
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

PHENYLS
Effect of vinyl and phenyl contents of silicone gum on the properties of the elastomers and cellular silicone cushions
[UCRL-53105] N81-23298

PHILOSOPHY
Procedural semantics as a theory of meaning
[AD-A097630] N81-23815

PHOSPHORIC ACID
Evaluation of distributed gas cooling of pressurized PAFC for utility power generation
[NASA-CR-165303] N81-23600

PHOTOCHEMICAL REACTIONS
Multiphoton dissociation spectroscopy and photochemistry
[DOE/ER-10660/1] N81-23225
Bioassay of polycyclic aromatic hydrocarbons
[DOE/EV-04477/T2] N81-23677
NOAA Meteorology Laboratory support to the Environmental Protection Agency
[PB81-149072] N81-23732
Physical and chemical studies of chlorophyll in microemulsions
[DOE/ER-04452/3] N81-23788

PHOTOCONDUCTIVITY
Low cost sprayed CdTe solar cell research
[SERI/PR-8104-3-T1] N81-23659

PHOTODIODES
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
X-ray diodes for laser fusion plasma diagnostics
[LA-7941-MS] N81-23904
PHOTODISSOCIATION
Multiphoton dissociation spectroscopy and photochemistry
[DOE/ER-10660/1] N81-23225
PHOTOELASTICITY
Extension of oblique incidence method to photo-orthotropic-elasticity
[NASA-CR-164334] N81-23492
PHOTOELECTRIC CELLS
Development of photoelectrochemical cells based on compound semiconductors and nonaqueous electrolytes
[SERI/PR-8002-7-T1] N81-23214
PHOTOELECTRIC EFFECT
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437
PHOTOELECTRIC GENERATORS
Assessment of nickel-hydrogen batteries for terrestrial solar applications
[SAND-80-7191] N81-23706
PHOTOELECTROCHEMICAL DEVICES
Development of photoelectrochemical cells based on compound semiconductors and nonaqueous electrolytes
[SERI/PR-8002-7-T1] N81-23214
PHOTOELECTROCHEMISTRY
Studies of the photoelectrochemistry of organic dyes using attenuated total reflection techniques
[DOE/ER-10632/1] N81-23213
PHOTOELECTRON SPECTROSCOPY
Correction for loss effects in valence-band XPS spectra by deconvolution
[AD-A097598] N81-23209
The bonding of H to Ni, Pd and Pt surfaces --- photoelectron spectroscopy
[AD-A097361] N81-23276
PHOTOGRAMMETRY
Status and future of extraterrestrial mapping programs
[NASA-CR-3390] N81-23989
PHOTOGRAPHIC RECORDING
Thick phase holograms
[AD-A097201] N81-23436
PHOTOINTERPRETATION
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery
[NASA-CR-164279] N81-23562
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583
PHOTOMAPPING
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
PHOTONS
Virtual photoproduction of hidden and open charm
[LBL-11844] N81-23870
PHOTORECONNAISSANCE
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583
PHOTOSENSITIVITY
Magnetic-field effects on photosensitized electron transfer reactions
[LBL-12361] N81-23222
Kinetics of photosensitized electron transport across a membrane boundary
[LBL-12360] N81-23223
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437
PHOTOTHERMAL CONVERSION
Economic assessment of advanced central-receiver solar-thermal power systems
[DOE/SF-10601/1] N81-23681
PHOTOVOLTAIC CELLS
Anti-reflection coatings applied by acid leaching process
[NASA-CR-164322] N81-23612
A Module Experimental Process System Development Unit (MEPSDU) --- development of low cost solar arrays
[NASA-CR-164325] N81-23616
Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617
System integration issues of residential solar photovoltaic systems
[DOE/RA-29349/01] N81-23643
Electrochemical photovoltaic cells CdSe thin film electrodes
[SERI/TR-8002-8-T1] N81-23676
Block 5 solar cell module: Design and test specification for intermediate-load applications, 1981
[DOE/CS-31037/T1] N81-23693
Assessment of nickel-hydrogen batteries for terrestrial solar applications
[SAND-80-7191] N81-23706
Sequential purification and crystal growth for the production of low cost silicon substrates
[DOE/SERI-8119/3-4] N81-23930
PHOTOVOLTAIC CONVERSION
Photovoltaics Program Utility Interface Southwest Regional Workshop Proceedings
[NASA-CR-164284] N81-23601
Thin films of InP for photovoltaic energy conversion
[COO-3004-4] N81-23632
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692
PHTHALOCYANIN
New type of metallo-organic polymer: Bimetalloporphyrins. Investigating a new chemistry of metallophthalocyanines
[AD-A097447] N81-23286
PILOT PERFORMANCE
Effects of curved approach paths and advanced displays on pilot scan patterns
[NASA-TP-1846] N81-23791
Refinements and validation testing of Human Operator Performance Emulator (HOPE)
[AD-A097449] N81-23793
Effects of criteria on flight simulation. Study 2: Multiple criteria
[AD-A097526] N81-23794
Preliminary study of head-up assessment techniques. 1: Viewing duration of instrument panel and HUD symbology using a recall methodology
[NASA-TM-78517] N81-23798
A preliminary study of head-up display assessment techniques. 2: HUD symbology and panel information search time
[NASA-TM-78536] N81-23799
PILOT PLANTS
Mechanisms of erosion/corrosion of metals and their oxide scales --- coal gasification pilot plant components
[LBL-12023] N81-23255
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267
Coal gasification pilot plant support studies
[FE-2806-7] N81-23315
A Module Experimental Process System Development Unit (MEPSDU) --- development of low cost solar arrays
[NASA-CR-164325] N81-23616
PINCH EFFECT
Sausage mode of a pinched charged particle beam
[UCID-18940] N81-23885
PIONEER VENUS SPACECRAFT
Pioneer Venus probe models instrumented prop tests
[NASA-CR-164298] N81-23174
PIONS
Three-body helicity formalism applied to pion-deuteron scattering
[DOE/ER-05223/31] N81-23874
PIPES (TUBES)
Cost-effectiveness of countermeasures to intergranular stress corrosion cracking in BWR piping
[EPRI-NP-1703] N81-23252
Machining with a round-nosed form tool
N81-23457
Analytical treatment of gravity effects on gas loaded variable conductance heat pipes
[AD-A097679] N81-23629
PISTONS
A note on sound radiation into a uniformly flowing fluid
[NASA-CR-166177] N81-23861
PITOT TUBES
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters
[ISSN-0077-5606] N81-23412
PLAINS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
PLANETARY ATMOSPHERES
Superrotation planetary atmospheres: Mechanical analogy, angular momentum budget and simulation of the spin up process
[NASA-TM-82137] N81-23987
On the polarity of cyclostrophic flow in planetary atmospheres
[NASA-TM-82136] N81-23990
PLANETARY BOUNDARY LAYER
NOAA Meteorology Laboratory support to the Environmental Protection Agency
[PB81-149072] N81-23732
PLANETARY ROTATION
Superrotation planetary atmospheres: Mechanical analogy, angular momentum budget and simulation of the spin up process
[NASA-TM-82137] N81-23987
On the polarity of cyclostrophic flow in planetary atmospheres
[NASA-TM-82136] N81-23990
PLANT DESIGN
High-reliability gas turbine combined-cycle development program. Phase 1: Summary
[EPRI-AP-1681-SU] N81-23471
Solar heating and cooling system installed at RKL Controls Company, Lumberton, New Jersey
[NASA-CR-161679] N81-23597
Advanced solar concentrator: Executive summary
[NASA-CR-164318] N81-23624
Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Advanced system demonstration for utilization of biomass as an energy source. Volume 4: Design drawings
[DOE/ET-20055/T2-VOL-4] N81-23667
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility
[SAN-0307-1-VOL-3] N81-23674
Guide for the assessment of the reliability of gasification-combined-cycle power plants
[EPRI-AP-1610] N81-23704
PLANT STRESS
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547

PLASMA CONTROL
High power ICRH experiments on the Wisconsin levitated octupole
[DOE/ET-53051/15] N81-23903
PLASMA CURRENTS
Limiting beta of stellarators with no net current
[PPPL-1736] N81-23913
PLASMA DENSITY
Two-wavelength HeNe laser interferometer
[UCID-18988] N81-23456
PLASMA DIAGNOSTICS
MFTF Thomson scattering: A system study
[UCRL-53051] N81-23371
X-ray diodes for laser fusion plasma diagnostics
[LA-7941-MS] N81-23904
Quantitative measurements in laser-induced plasmas using optical probing
[COO-4001-8] N81-23912
PLASMA EQUILIBRIUM
Tensor pressure Tokamak equilibrium and stability
[ORNL/TM-7120] N81-23906
PLASMA FOCUS
Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909
PLASMA GUNS
Compact toroids generated by a magnetized coaxial source in the CTX experiment
[LA-UR-81-325] N81-23917
PLASMA HEATING
High power ICRH experiments on the Wisconsin levitated octupole
[DOE/ET-53051/15] N81-23903
Stable heating and burn simulations of a reversed-field pinch reactor
[COO-2218-189] N81-23918
PLASMA PHYSICS
Preliminary investigation of acoustic oscillations in an H2-O2 fired Hall generator
[NASA-TM-81756] N81-23610
High magnetic field MHD generator program
[DOE/ET-15611/3] N81-23902
Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909
Plasma physics plotting package
[LA-8161-M] N81-23921
Dynamic theory: A new view of space, time, and matter
[LA-8370-MS] N81-23934
PLASMA SPECTRA
Multielement analysis studies by flame and inductively coupled plasma spectroscopy utilizing computer-controlled instrumentation
[PB81-149528] N81-23231
PLASMA-PARTICLE INTERACTIONS
Magnetosphere-Ionosphere coupling through the auroral acceleration region N81-23513
PLASMAS (PHYSICS)
S-band microwave system, revision
[AD-A097641] N81-23348
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743
D-D Tokamak reactor studies
[ANL/FPP/TM-138] N81-23907
Plasmas in particle accelerators: Adiabatic theories for bunched beams
[UCID-18947] N81-23920
PLASMONS
Attenuation and coupling of far infrared surface plasmons N81-23888
An experimental study of electronic states at metal dielectric interfaces
[AD-A097363] N81-23929
PLASTIC DEFORMATION
Some thoughts on material stability
[AD-A097350] N81-23499
Some stability conditions for a compressible elastic material
[AD-A097351] N81-23500
Linear-elastic and elastic plastic fracture mechanics of structural materials --- J integral method
[ESA-TT-649] N81-23505
Constitutive models for compressive loading of geologic materials
[UCRL-53073] N81-23757
PLATINUM
The bonding of H to Ni, Pd and Pt surfaces --- photoelectron spectroscopy
[AD-A097361] N81-23276
PLOTTING
A general algorithm for the construction of contour plots
[NASA-TM-81287] N81-23813
PLUMES
Investigation of numerical modeling techniques for recirculations flows: Parts 1 and 2
[EPRI-CS-1665-PT-1] N81-23427
Lagrangian measurement platform flights in support of the Tennessee Plume Study: Field effort and data
[SAND-79-1336] N81-23717
PLUTONIUM 238
Space nuclear safety and fuel program
[LA-8749-PR] N81-23189
POINT SOURCES
On source radiation
[NASA-CR-166176] N81-23343
POINTING CONTROL SYSTEMS
Methods and techniques used for Symphonie attitude determination and control N81-23148
POLAR CAPS
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754
POLAR REGIONS
Propagation effects in high latitudes --- Intelsat and Symphonie transmissions N81-23132
Modelling the high-latitude ionosphere N81-23514
Neutral winds in the polar ionosphere N81-23519
On the morphology of the polar thermosphere N81-23528
POLARITY
On the polarity of cyclostrophic flow in planetary atmospheres
[NASA-TM-82136] N81-23990
POLARIZATION (CHARGE SEPARATION)
Thermally stimulated currents in glasses N81-23272
Thermally stimulated polarization and depolarization current (TSPC/TSDC) in glass N81-23273
POLICIES
DOD's use of remotely piloted vehicle technology offers opportunities for saving lives and dollars
[AD-A097419] N81-23074
Policy options for the transportation-air-quality process
[PB81-150914] N81-23737
National information services with international orientation N81-23959
Information services for legislative policy making N81-23965
POLLUTION CONTROL
Catalytic combustion of coal-derived liquid fuels
[EPRI-AP-1666] N81-23215
Advanced electrode design for electrostatic precipitators
[DOE/EV-10506/T1] N81-23395
Testing of new technology: Three-way catalyst equipped vehicles in Los Angeles
[PB81-138075] N81-23474
Symposium on the transfer and utilization of particulate control technology. Volume 3: Particulate control devices
[PB81-144800] N81-23734
Economic implications of regulating nonaerosol chlorofluorocarbon emission: An executive briefing
[PB81-146698] N81-23735
Flexible urethane foams and chlorofluorocarbon emissions: A support document for economic implications of regulating chlorofluorocarbon emissions from nonaerosol applications
[PB81-146706] N81-23736
A study of poultry processing plant noise control techniques
[NASA-CR-164291] N81-23863
POLLUTION MONITORING
Lagrangian measurement platform flights in support of the Tennessee Plume Study: Field effort and data
[SAND-79-1336] N81-23717
Sensitivity and response time improvements in millimeter-wave spectrometers
[LBL-8789] N81-23726
Asbestos analytical programs bulk sample analysis: New York City and Maryland
[PB81-146722] N81-23729
Measurement of asbestos air pollution inside buildings sprayed with asbestos
[PB81-147001] N81-23731
POLLUTION TRANSPORT
Feasibility of large scale deliberate tracer release experiments in or below the oceanic thermocline
[DOE/EV-10038/1] N81-23783
POLYBUTADIENE
The role of chemical bonding in adhesion
[AD-A097388] N81-23281
POLYCRYSTALS
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
Development of polycrystal GaAs solar cells
[SERI/PR-8032-1-T1] N81-23660
Sequential purification and crystal growth for the production of low cost silicon substrates
[DOE/SERI-8119/3-4] N81-23930
Influence of grain boundaries on the electrical properties of polycrystalline-silicon films
[DOE/ER-02899/T2] N81-23933
POLYESTERS
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290
POLYETHYLENES
Crystallite sizes in polyethylene single crystals and melt-crystallized polyethylene samples N81-23923
POLYIMIDES
Tribological properties and thermal stability of various types of polyimide films
[NASA-TM-81765] N81-23275
POLYMER CHEMISTRY
Synthesis and properties of highly conducting derivatives of polyacetylene, polyparaphenyleneand graphite N81-23274
Intramolecular flexibility of relatively rigid polymers, and intermolecular interactions in ordered polymer systems, part 2
[AD-A097424] N81-23284
Homogeneous and heterogeneous rubbery/rubbery diblock copolymers and polymer blends - A unified view
[AD-A097690] N81-23287
POLYMER MATRIX COMPOSITE MATERIALS
Composite materials for structural design --- polymer matrix composite materials
[AD-A097297] N81-23195
POLYMER PHYSICS
Crystallite sizes in polyethylene single crystals and melt-crystallized polyethylene samples N81-23923
POLYMERIC FILMS
Tribological properties and thermal stability of various types of polyimide films
[NASA-TM-81765] N81-23275
POLYMERIZATION
In-place polymerizations of electrophilic olefins
[AD-A097453] N81-23277
Synthesis of hydroxy-terminated dinitropropyl acrylate polymers
[AD-A097577] N81-23291
POLYMERS
Threshold tear strength of some molecular networks --- high temperatures and polymers
[AD-A097232] N81-23283
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290
POLYNOMIALS
Polynomial approximation techniques for differential equations in electrochemical problems
[AD-A097631] N81-23833
POLYPHENYLS
Synthesis and properties of highly conducting derivatives of polyacetylene, polyparaphenyleneand graphite N81-23274
POLYURETHANE FOAM
Flexible urethane foams and chlorofluorocarbon emissions: A support document for economic implications of regulating chlorofluorocarbon emissions from nonaerosol applications
[PB81-146706] N81-23736
POLYVINYL ALCOHOL
Inexpensive cross-linked polymeric separators made from water soluble polymers
[NASA-TM-82619] N81-23205

POPULATION THEORY
Statistical classification techniques for engineering and climatic data samples
[NASA-CR-164337] N81-23764
POPULATIONS
Empirical Bayes rules for selecting good populations
[AD-A097619] N81-23843
PORCELAIN
The effect of cooling rate on the apparent bond strength of porcelain-metal couples
[AD-A097492] N81-23279
POROSITY
High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295
Effects of preignition on pulverized coal combustion
[DOE/PC-30293/1] N81-23312
PORPHYRINS
Factors influencing the redox reactions of iron porphyrins N81-23197
New type of metallo-organic polymer: Bimetalloporphyrins. Investigating a new chemistry of metallophthalocyanines
[AD-A097447] N81-23286
PORTABLE EQUIPMENT
Transportable terminals for STEP N81-23138
Highly mobile Earth stations --- Antenna design and packaging N81-23139
Transportable ground stations --- for Symphonie N81-23140
Telecommunications services for special events --- Symphonie applications N81-23160
PORTS (OPENINGS)
High-pressure viewports for infrared systems. Phase 1: Germanium --- underwater vehicle applications
[AD-A097089] N81-23897
PORTUGAL
Portuguese scientific and technical information scene: Present status and future prospects N81-23957
POSITION (LOCATION)
The estimation of palaeomagnetic pole positions
[AD-A097488] N81-23745
POSITIVE IONS
The emission of electrons and positive ions from fracture of materials
[AD-A097390] N81-23194
Energetic 0-positive precipitation: A significant energy N81-23527
POSTURE
A motion cycle simulator for analysis and optimization of human power N81-23797
POTATOES
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
POWER CONDITIONING
The 15kW General Purpose Power Conditioner (frequency changer), inverter/ converter integration
[AD-A097165] N81-23380
POWER LINES
Guide to substation grounding and bonding for mine power systems
[PB81-148264] N81-23592
POWER PLANTS
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560
POWER SPECTRA
DNA/PLACES, barium event JAN: Quick-look field report of 'in situ' probe measurements
[AD-A097227] N81-23751
Note on computer graphics for maximum entropy spectral analysis
[AD-A097121] N81-23822
PRECIPITATION (METEOROLOGY)
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
Low-level convergence and the prediction of convective precipitation in south Florida
[AD-A097553] N81-23777
PRECIPITATION HARDENING
Iron-base alloys strengthened by Laves phases as substitutes for stainless steels
[PB81-150153] N81-23268
PREDICTION ANALYSIS TECHNIQUES
Comparison of theoretical predictions of orbiter airloads with wind tunnel and flight test results for a Mach number of 0.52
[NASA-TM-81358] N81-23066
Ionospheric predictions for HF radio systems: The future N81-23537
An empirical model building criterion based on prediction with applications in parametric cost estimation
[AD-A097535] N81-23852
PREDICTIONS
Prediction techniques for forthcoming solar maxima N81-23536
The day-by-day variability of the ionospheric peak density N81-23539
Experimental validation of the ONSOD Omega prediction method N81-23540
Design optimization in underground coal systems. Volume 7: Prediction of mining subsidence and related parameters over longwall mining operations
[FE-1231-25] N81-23576
Long-term measurements of ground motions offshore
[SAND-80-2718C] N81-23756
PRESSURE DISTRIBUTION
A study of real jet effects on the surface pressure distribution induced by a jet in a crossflow
[NASA-CR-166150] N81-23029
Two-dimensional aerodynamic characteristics of the NACA 0012 airfoil in the Langley 8 foot transonic pressure tunnel
[NASA-TM-81927] N81-23036
Oscillating supercritical airfoils in the transonic regime with viscous interactions N81-23047
Measurement and analysis of the periodic variation of total pressure in an axial-flow compressor stage
[AD-A097296] N81-23090
PRESSURE SENSORS
In-situ measurement of soil properties
[PB81-130064] N81-23328
PRESSURE VESSELS
Hydrogen attack of pressure-vessel steel
[DOE/ER-02872/5] N81-23258
Hardness tests on irradiated pressure vessel steel
[IS-T-942] N81-23259
Survey of hydrogen monitoring devices
[UCRL-84164] N81-23444
Evaluation of distributed gas cooling of pressurized PAFC for utility power generation
[NASA-CR-165303] N81-23600
PRINTED CIRCUITS
Quasi-optical techniques for millimeter and submillimeter-wave circuits
[AD-A097355] N81-23388
PROBABILITY DENSITY FUNCTIONS
Prediction of the turbulent wake with second-order closure
[NASA-CR-164294] N81-23038
PROBABILITY DISTRIBUTION FUNCTIONS
Computer simulation of random variables and vectors with arbitrary probability distribution laws
[NASA-TP-1859] N81-23838
Asymptotic power of EDF statistics for exponentiality against Weibull and Gamma alternatives
[AD-A097107] N81-23841
The accuracy of a modified Peizer Approximation to the hypergeometric distribution, with comparisons to some other approximations
[AD-A097541] N81-23854
PROBABILITY THEORY
Uncertainty measurement in a complex task as a function of response mode and event type characteristics
[AD-A097678] N81-23792
Use of the TI 59 with applications to probability and statistical analysis
[AD-A097384] N81-23807
Some results on the overall reliability of undirected graphs
[AD-A097445] N81-23832
Brownian approximations to first passage probabilities
[AD-A097106] N81-23842
Alternative frameworks for the reconciliation of probability assessments
[AD-A097584] N81-23850
PROBLEM SOLVING
Research on parallelism in problem-solving systems
[AD-A097608] N81-23805
PROCEDURES
Functional testing airborne radars
[AD-A097562] N81-23358
PROCEEDINGS
NASA Metrology and Calibration, 1980
[NASA-CP-2174] N81-23432
PROCESS CONTROL (INDUSTRY)
Molten salt coal gasification process development unit, phase 2
[DOE/ET-10296/70] N81-23310
Distributed computing for advanced levels of machinery control N81-23458
Compensatory control of form error in machining N81-23459
PROCESS HEAT
Direct application of geothermal energy at the L'eggs Product Plant, Las Cruses, New Mexico
[DOE/ID-12047/3] N81-23636
Midtemperature solar systems test facility predictions for thermal performance based on test data: Solar kinetics T-600 solar collector with FEK 244 reflector surface
[SAND-80-1964/9] N81-23675
PROCESSING
On the degree of inflation of measures of fit induced by empirical model building
[AD-A097536] N81-23856
PROCUREMENT
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065
PRODUCT DEVELOPMENT
The travelling wave tube TL 4003 and further development of TWT --- Symphonie satellites N81-23162
Application of Symphonie experiences in follow-up projects at MBB N81-23163
The attitude sensors on Symphonie and their subsequent development N81-23165
Development of a water displacing, touch-up paint
[AD-A097125] N81-23288
Development of a gasless pyrotechnic cap
[AD-A097197] N81-23301
A solid-state digital temperature recorder for space use
[NASA-TM-81267] N81-23434

Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621

PRODUCTION COSTS
Some propositions on cost functions
[AD-A097539] N81-23970

PRODUCTION ENGINEERING
Anti-reflection coatings applied by acid leaching process
[NASA-CR-164322] N81-23612
The establishment of a production-ready manufacturing process utilizing thin silicon substrates for solar cells
[NASA-CR-164327] N81-23615
A Module Experimental Process System Development Unit (MEPSDU) --- development of low cost solar arrays
[NASA-CR-164325] N81-23616
Continuous model of an unreliable two-stage material flow system with a finite interstage buffer
[PB81-146862] N81-23859

PRODUCTION MANAGEMENT
Some propositions on cost functions
[AD-A097539] N81-23970

PROGRAM VERIFICATION (COMPUTERS)
Evaluating a data abstraction testing system based on formal specifications
[AD-A097231] N81-23809

PROGRAMMED INSTRUCTION
Continuing education through computer-aided instruction
[LA-UR-81-82] N81-23935

PROGRAMMING LANGUAGES
Procedural semantics as a theory of meaning
[AD-A097630] N81-23815

PROJECT MANAGEMENT
The Symphonie program: Objectives, operations and technical operations of the project N81-23103
Organization and operational configuration of the Symphonie ground control system N81-23146
Summary of operating experience with the Symphonie satellites N81-23150

PROJECT PLANNING
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065
Symphonie program planned for Ivory Coast 1979 - 1980 N81-23156
Indian domestic satellite (INSAT) system N81-23168
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary
[SAN-0307-1-VOL-1] N81-23671
Plan for the future of neutron research on condensed matter: An Argonne National report prepared in response to the report of the Review Panel on Neutron Scattering
[ANL-81-5] N81-23878
Authorizing appropriations to the National Aeronautics and Space Administration for fiscal year 1982
[H-REPT-97-32] N81-23972
Methodology for urban rail and construction technology research and development planning
[NASA-CR-164260] N81-23975

PROJECTS
National Aeronautics and Space Administration Authorization Act, 1982
[S-REPT-97-100] N81-23973

PROLATE SPHEROIDS
Research on near field pattern effects
[AD-A097102] N81-23353

PROPANE
Propane conversion in the vehicle fleet at the Idaho National Engineering Laboratory
[EGG-TRANS-5291] N81-23977

PROPELLANT BINDERS
Heat sterilizable solid-propellant development
[NASA-CR-164281] N81-23300

PROPELLANT GRAINS
Dynamic burning effects in the combustion of solid propellants with cracks, and the use of granular bed combustion models
[AD-A097474] N81-23302

PROPELLANT TESTS
Heat sterilizable solid-propellant development
[NASA-CR-164281] N81-23300

PROPELLANTS
Hot spot initiation patterns in shocked explosives and propellants recorded by thermal film
[AD-A097088] N81-23305

PROPELLERS
Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel
[NASA-TM-81285] N81-23039

PROPULSION SYSTEM CONFIGURATIONS
Application of ion implantation for the improvement of localized corrosion resistance of M50 steel bearings
[AD-A097230] N81-23466

PROPULSION SYSTEM PERFORMANCE
A nonlinear propulsion system simulation tehnique for piloted simulators
[NASA-TM-82600] N81-23085
Performance deterioration based on simulated aerodynamic loads test, JT9D jet engine diagnostics program
[NASA-CR-165297] N81-23086

PROTECTIVE COATINGS
Amorphous and microcrystalline thin films of iron-base alloys for corrosion resistant coatings N81-23235
Slime Analysis of painted steel panels immersed in Biscayne Bay, Miami Beach, Florida
[AD-A097229] N81-23280
Development of a water displacing, touch-up paint
[AD-A097125] N81-23288
Prolonging thermal barrier coated specimen life by thermal cycle management
[NASA-TM-81742] N81-23417
Anti-reflection coatings applied by acid leaching process
[NASA-CR-164322] N81-23612
Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619

PROTON BEAMS
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste
[BNL-28668] N81-23228

PROTON SCATTERING
Elastic scattering of polarized deuterons from hydrogen at 2.0, 1.6, and 1.2 GeV and search for critical opalescence in elastic scattering of protons from carbon-12 at 800 MeV
[LA-8662-T] N81-23872

PROTON-PROTON REACTIONS
Theoretical implications on ISABELLE physics --- proton, neutron, and annihilation reactions
[BNL-28825] N81-23916

PROTONS
Instrument development for materials science research at WNR
[LA-UR-80-2969] N81-23442

PROTOTYPES
High-reliability gas turbine combined-cycle development program, phase 1, volume 2
[EPRI-AP-1681-VOL-2] N81-23472

PSYCHOLOGICAL FACTORS
Alternative frameworks for the reconciliation of probability assessments
[AD-A097584] N81-23850

PUBLIC HEALTH
Comparing energy technology alternatives from an environmental perspective
[DOE/EV-0109] N81-23688
Fluidized-bed combustion emissions: Toxicology program
[LMF-83] N81-23718
Diesel-exhaust emissions-toxicology program
[LMF-81] N81-23719
Asbestos analytical programs bulk sample analysis: New York City and Maryland
[PB81-146722] N81-23729
Report of the NASA working group on tropospheric program planning
[NASA-RP-1062] N81-23742

PUERTO RICO
Physical oceanographic data from the OTEC Punta Tuna, Puerto Rico site, September 1979 - June 1980
[LBL-12327] N81-23784

PULSE CODE MODULATION
Digital communication multiple access scheme --- using Symphonie N81-23116

PULSE COMMUNICATION
Transmission of TDMA signals at 60 Mbit/s in the Symphonie system N81-23113
Results of the 60 Mbit/s TDMA system. Tests via Symphonie N81-23114
Experimentation with a Spread Spectrum Multiple Access communication system via the Symphonie satellite N81-23115
Digital communication multiple access scheme --- using Symphonie N81-23116
Suppression of narrowband interference in pseudo-noise spread spectrum systems
[AD-A097336] N81-23368
A study of integrated switching techniques --- voice/data multiplexers
[AD-A097243] N81-23806

PULSE COMPRESSION
The Celtic system: An experiment with Symphonie N81-23117

PULSE DURATION MODULATION
KrF laser fusion: Perform optical systems study of direct short pulse extraction
[DOE/DP-40069/3] N81-23454

PULSE POSITION MODULATION
Maximizing throughput over an average-power-limited and band-limited optical pulse position modulation channel N81-24009

PULSED RADIATION
Research in laser processes
[AD-A097563] N81-23449

PUMPING
Ground water overdrafting must be controlled
[PB81-156135] N81-23589

PUMPS
Traction drive for cryogenic boost pump --- hydrogen oxygen rocket engines
[NASA-TM-81704] N81-23188

PURIFICATION
Sequential purification and crystal growth for the production of low cost silicon substrates
[DOE/SERI-8119/3-4] N81-23930

PURITY
Electrochemical corrosion of iron-chromium alloys under ultra-high-purity conditions --- sulfuric acid solutions
[PB81-147134] N81-23271

PYROLYSIS
Effects of preignition on pulverized coal combustion
[DOE/PC-30293/1] N81-23312
Pyrolysis of coal-derived fuels using the laser-powered homogeneous pyrolysis technique
[DOE/PC-30217/T1] N81-23320

PYROTECHNICS
Development of a gasless pyrotechnic cap
[AD-A097197] N81-23301

Q

Q SWITCHED LASERS
Development of a novel laser material for miniaturized laser systems
[AD-A097477] N81-23451

QUADRATIC EQUATIONS
The stability of second order quadratic differential equations, part 3
[AD-A097627] N81-23831

QUADRATIC PROGRAMMING
QP-based methods for large-scale nonlinearly constrained optimization
[AD-A097407] N81-23830

QUALITY CONTROL
Thermal analysis of malleable base white iron for quality control N81-23237
NASA Metrology and Calibration, 1980
[NASA-CP-2174] N81-23432
High precision fiber development
[AD-A097444] N81-23891

QUANTITATIVE ANALYSIS
An integrated exhaust gas analysis system with self-contained data processing and automatic calibration
[NASA-TM-81592] N81-23435

QUANTUM EFFICIENCY
Development of a novel laser material for miniaturized laser systems
[AD-A097477] N81-23451

QUANTUM MECHANICS
Thin film optical devices and quantum electronics
[AD-A097246] N81-23450
QUANTUM THEORY
Dynamic theory: A new view of space, time, and matter
[LA-8370-MS] N81-23934
QUENCHING (COOLING)
The theory of flammability limits. Conductive-convective wall losses and thermal quenching
[PB81-150047] N81-23233
QUINOLINE
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30075/4] N81-23317

R

RADAR ANTENNAS
Phase synchronizing, a nonrigid, distribution transmit-receive radar antenna array
[AD-A097486] N81-23359
RADAR ASTRONOMY
Telecommunications and data acquisition
[NASA-CR-164288] N81-23997
Radio Astronomy N81-23998
RADAR DETECTION
Environment-adaptive radar techniques
[AD-A097262] N81-23351
RADAR EQUIPMENT
Functional testing airborne radars
[AD-A097562] N81-23358
RADAR IMAGERY
An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery
[NASA-CR-164279] N81-23562
RADAR SCATTERING
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565
RADAR TRACKING
Environment-adaptive radar techniques
[AD-A097262] N81-23351
Research and technology developments in aeronautics, atmospheric and oceanographic measurements, radar applications, and remote sensing of insects using radar
[NASA-TM-73289] N81-23996
RADIANT FLUX DENSITY
On source radiation
[NASA-CR-166176] N81-23343
Economic analysis of the unified heliostat array
[DOE/SF-10802/1] N81-23657
RADIATION ABSORPTION
Research in laser processes
[AD-A097563] N81-23449
RADIATION DAMAGE
Integral tests of fast neutron dosimetry cross sections
[EPRI-NP-1658] N81-23876
RADIATION DISTRIBUTION
On source radiation
[NASA-CR-166176] N81-23343
RADIATION EFFECTS
Hardness tests on irradiated pressure vessel steel
[IS-T-942] N81-23259
Solar radiations and their interactions with the terrestrial environment N81-23509
Alloy development for irradiation performance in fusion reactors
[DOE/ER-10107/1] N81-23914
RADIATION THERAPY
Semiconductor detectors for medical tomography with high-energy heavy ions
[LBL-11037] N81-23790
RADIATION TOLERANCE
Performance of high resistivity n+pp+ silicon solar cells under 1 MeV electron irradiation
[NASA-TM-82610] N81-23626
RADIATION TRANSPORT
Particle simulation code for longitudinal dynamics of heavy ion beams
[LBL-12205] N81-23910
RADIATIVE HEAT TRANSFER
Combined radiation and conduction in a nongray participating medium that absorbs, emits, and anisotropically scatters N81-23406
RADIATIVE TRANSFER
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Development of infrared and microwave techniques for cloud parameter inference from satellite imagery and sounder data
[AD-A097592] N81-23770
RADIO ASTRONOMY
Telecommunications and data acquisition
[NASA-CR-164288] N81-23997
Radio Astronomy N81-23998
RADIO ATTENUATION
The CTS 11.7 GHz angle of arrival experiment
[NASA-CR-164338] N81-23740
RADIO COMMUNICATION
Design and implementation of a small terminal for the Everest 78 expedition --- Symphonie Himalsat experiment N81-23122
Efficient spectrum utilization in mobile radio communication systems N81-23338
Some considerations upon models for ionospheric radio communications forecasting N81-23541
Evaluation of the Transcribed Weather Broadcast (TWEB) system and alternatives. Volume 2: Cost analyses of the TWEB radio and telephone accessible mass weather dissemination services
[AD-A097567] N81-23769
RADIO FREQUENCIES
Transportable terminals for STEP N81-23138
The 34-meter antenna-subreflector translations to maximize RF gain N81-24013
RADIO FREQUENCY HEATING
High power ICRH experiments on the Wisconsin levitated octupole
[DOE/ET-53051/15] N81-23903
RADIO FREQUENCY INTERFERENCE
Frequency receiver development for the satellite communications (SATCOM) signal analyzer
[AD-A097664] N81-23362
Radio frequency interference protection of communications between the Deep Space Network and deep space flight projects N81-24015
RADIO INTERFEROMETERS
Telecommunications and data acquisition
[NASA-CR-164288] N81-23997
RADIO RECEIVERS
Frequency receiver development for the satellite communications (SATCOM) signal analyzer
[AD-A097664] N81-23362
RADIO RECEPTION
Acceptance and operation of small receiving stations in urban areas N81-23137
RADIO SIGNALS
Radio frequency interference protection of communications between the Deep Space Network and deep space flight projects N81-24015
RADIO TRANSMISSION
Analog television and radio transmission experiments --- Symphonie satellites N81-23126
Propagation effects in high latitudes --- Intelsat and Symphonie transmissions N81-23132
Satellite transmission serving radio and television --- Symphonie experiments N81-23152
Ionospheric predictions for HF radio systems: The future N81-23537
Experimental validation of the ONSOD Omega prediction method N81-23540
RADIO WAVES
The physics of radio wave absorption --- ionosphere N81-23515
RADIOACTIVE ISOTOPES
Feasibility of large scale deliberate tracer release experiments in or below the oceanic thermocline
[DOE/EV-10038/1] N81-23783
RADIOACTIVE WASTES
Meteorological and air quality data report. WIPP site: Eddy County, New Mexico --- radioactive waste disposal site selection
[SAND-81-7052] N81-23779
Oregon-based activities in support of the Basalt Waste Isolation Project
[RHO-BWI-SA-42] N81-23880
Nevada nuclear waste storage investigations
[NVO-196-20] N81-23881
Review of high-level waste form properties
[PNL-3035] N81-23882
RADIOISOTOPE BATTERIES
Space nuclear safety and fuel program
[LA-8749-PR] N81-23189
Radioisotope space power generator
[GA-A-15683] N81-23638
RADIOSONDES
Research study: STS-1 Orbiter Descent
[NASA-CR-161754] N81-23763
RADIOTELEPHONES
Efficient spectrum utilization in mobile radio communication systems N81-23338
RAIL TRANSPORTATION
Methodology for urban rail and construction technology research and development planning
[NASA-CR-164280] N81-23975
RAINSTORMS
Low-level convergence and the prediction of convective precipitation in south Florida
[AD-A097553] N81-23777
RAMAN SPECTRA
Raman scattering by a molecule adsorbed at the surface of a thin metallic film
[IS-T-922] N81-23873
RAMJET ENGINES
Multiple-scale turbulence modeling of boundary layer flows for scramjet applications
[NASA-CR-3433] N81-23411
RANDOM NOISE
Suppression of narrowband interference in pseudo-noise spread spectrum systems
[AD-A097336] N81-23368
RANDOM VARIABLES
Distances of random variables and point processes
[AD-A097621] N81-23827
Computer simulation of random variables and vectors with arbitrary probability distribution laws
[NASA-TP-1859] N81-23838
RANDOM WALK
Response of nonlinear mechanical systems to random excitation. Part 1: Markov methods N81-23485
RANGEFINDING
Poster error probability in the Mu-11 Sequential Ranging System N81-24001
RANGELANDS
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
RANKING
Rank-order tests for the parallelism of several regression surfaces
[AD-A097166] N81-23857
RAPID TRANSIT SYSTEMS
Methodology for urban rail and construction technology research and development planning
[NASA-CR-164280] N81-23975
RARE GASES
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437
RAY TRACING
Ionospheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760
REACTION KINETICS
Kinetic studies of heterogeneous biocatalysis using the rotating ring-disk enzyme electrode N81-23199
Some topics in applied electrochemical kinetics
[AD-A097405] N81-23206
Radiation/catalytic augmented combustion
[AD-A097442] N81-23208
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227
Surface science and heterogeneous catalysts
[LBL-11690] N81-23230
Gaseous sulfidation of pure molybdenum at 700 deg - 950 deg C N81-23239
Electrochemical corrosion of iron-chromium alloys under ultra-high-purity conditions --- sulfuric acid solutions
[PB81-147134] N81-23271
An investigation of unique metal complexes produced using polystyrene 2,2 prime-bipyridine as a support, and several hydrogenation catalysts derived from this copolymer
[AD-A097174] N81-23285
Synthesis of hydroxy-terminated dinitropropyl acrylate polymers
[AD-A097577] N81-23291

Effects of preignition on pulverized coal combustion
[DOE/PC-30293/1] N81-23312
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30075/4] N81-23317
Pyrolysis of coal-derived fuels using the laser-powered homogeneous pyrolysis technique
[DOE/PC-30217/T1] N81-23320
Competing reaction channels in IR-laser-induced unimolecular reactions
[LBL-12213] N81-23455
Integral tests of fast neutron dosimetry cross sections
[EPRI-NP-1658] N81-23876

REACTOR DESIGN
D-D Tokamak reactor studies
[ANL/FPP/TM-138] N81-23907
Wave-driver options for low-aspect-ratio steady-state Tokamak reactors
[ANL/FPP/TM-141] N81-23915

REACTOR MATERIALS
Cost-effectiveness of countermeasures to intergranular stress corrosion cracking in BWR piping
[EPRI-NP-1703] N81-23252
Program to discover materials suitable for service under hostile conditions obtaining in equipment for the gasification of coal and other solid fuels
[FE-1784-69] N81-23253
Survey of hydrogen monitoring devices
[UCRL-84164] N81-23444
Alloy development for irradiation performance in fusion reactors
[DOE/ER-10107/1] N81-23914

REACTOR SAFETY
Space nuclear safety and fuel program
[LA-8749-PR] N81-23189

REACTOR TECHNOLOGY
Impact of operational experience on research and development --- nuclear power plants
[EPRI-NP-1689-SR] N81-23397
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692
Integral tests of fast neutron dosimetry cross sections
[EPRI-NP-1658] N81-23876

REAL TIME OPERATION
Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818

RECEIVERS
High temperature solar receiver
[NASA-CR-164332] N81-23614

RECLAMATION
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550

RECONNAISSANCE
Tropical cyclone forecast verification as a function of reconnaissance platform
[AD-A097454] N81-23775

RECONNAISSANCE AIRCRAFT
Computer simulation of human performance in electronic processed imagery systems
[AD-A097622] N81-23801

RECTENNAS
Satellite Power Systems (SPS) concept definition study (Exhibit D). Volume 7: System/subsystems requirements databook
[NASA-CR-3399] N81-23595

RECURSIVE FUNCTIONS
Recursive least squares with linear constraints
[UCRL-85330] N81-23837

REDOX CELLS
Factors influencing the redox reactions of iron porphyrins N81-23197

REDUCTION (CHEMISTRY)
Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211

REFINING
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613

REFLECTANCE
On the use of off-nadir pointing for increased temporal resolution of Earth observing satellite systems
[NASA-TM-82139] N81-23175
Thick phase holograms
[AD-A097201] N81-23436

REFLECTION
Studies of the photoelectrochemistry of organic dyes using attenuated total reflection techniques
[DOE/ER-10632/1] N81-23213

REFLECTORS
The 34-meter antenna-subreflector translations to maximize RF gain N81-24013

REFRACTIVITY
Atmospheric microwave refractivity and refraction
[NASA-CR-164339] N81-23739
Comparison of the Marine Index of refraction structure parameter, C2n, model with optical measurements
[AD-A097691] N81-23776
The acousto-optic interaction in an infinite slab of isotropic material
[AD-A097202] N81-23892

REFRACTORIES
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299

REFRACTORY MATERIALS
Materials for high-temperature hydrogen fluorine environments
[AD-A097426] N81-23190
Materials for high-temperature hydrogen fluorine environments --- HV laser system nozzles
[Y-2201] N81-23191
Microstructural effects on the mechanical properties and thermal shock resistance of a high alumina refractory concrete N81-23479

REFRACTORY METAL ALLOYS
Program to discover materials suitable for service under hostile conditions obtaining in equipment for the gasification of coal and other solid fuels
[FE-1784-69] N81-23253

REFRACTORY METALS
Cladding of metals to iron by vacuum rolling
[PB81-150096] N81-23476

REGIONS
Energetic particle precipitation at middle and low latitudes N81-23526

REGRESSION ANALYSIS
An empirical model building criterion based on prediction with applications in parametric cost estimation
[AD-A097535] N81-23852
Parametric cost methodology
[AD-A097537] N81-23855
On the degree of inflation of measures of fit induced by empirical model building
[AD-A097536] N81-23856
Rank-order tests for the parallelism of several regression surfaces
[AD-A097166] N81-23857

REGULATIONS
US Department of Energy environmental compliance program handbook: Federal regulations on air quality, fossile energy
[ORNL/EIS-176] N81-23727

REINFORCEMENT (STRUCTURES)
Coupled walls in earthquake-resistant buildings, modeling techniques and dynamic analysis
[PB81-132698] N81-23329
Stressed skin action in composite panels comprising steel sheeting and boards
[PB81-135733] N81-23331

RELATIVISTIC PARTICLES
Synchrotron emissivity from mildly relativistic particles
[NASA-CR-164335] N81-23868
Three-body helicity formalism applied to pion-deuteron scattering
[DOE/ER-05223/31] N81-23874

RELATIVITY
An algorithm for the rapid location of an extreme of a function subject only to geometric restrictions
[NASA-CR-160940] N81-23812

RELIABILITY ANALYSIS
Comparative analysis of techniques for evaluating the effectiveness of aircraft computing systems
[NASA-CR-159358] N81-23477
MEGA16 - Computer program for analysis and extrapolation of stress-rupture data
[NASA-TP-1809] N81-23486
Some results on the overall reliability of undirected graphs
[AD-A097445] N81-23832

RELIABILITY ENGINEERING
High-reliability gas turbine combined-cycle development program. Phase 1: Summary
[EPRI-AP-1681-SU] N81-23471
High-reliability gas turbine combined-cycle development program, phase 1, volume 2
[EPRI-AP-1681-VOL-2] N81-23472

REMOTE CONSOLES
CDC/1000: A Control Data Corporation remote batch terminal emulator for Hewlett-Packard minicomputers
[SAND-80-2548] N81-23811
Online microfilm recorders of Los Alamos National Laboratory
[LA-UR-81-284] N81-23953

REMOTE SENSING
Reconnaissance Sensor System exploitation
[AD-A097224] N81-23567
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583
Research and technology developments in aeronautics, atmospheric and oceanographic measurements, radar applications, and remote sensing of insects using radar
[NASA-TM-73289] N81-23996

REMOTE SENSORS
Space systems: An auroral imaging spectrophotometer (vacuum ultraviolet and visible)
[PB81-133621] N81-23446

REMOTELY PILOTED VEHICLES
DOD's use of remotely piloted vehicle technology offers opportunities for saving lives and dollars
[AD-A097419] N81-23074

REPEATERS
The Celtic system: An experiment with Symphonie N81-23117

REPORTS
STS-1 Mission Assessment
[NASA-TM-82348] N81-23180

REQUIREMENTS
Software requirements: A report on the state of the art
[AD-A097278] N81-23821

RESEARCH
Corrosion Research Center of the University of Minnesota
[DOE/ER-10450/1] N81-23294
Research on near field pattern effects
[AD-A097102] N81-23353
Plan for the future of neutron research on condensed matter: An Argonne National report prepared in response to the report of the Review Panel on Neutron Scattering
[ANL-81-5] N81-23878

RESEARCH AND DEVELOPMENT
Impact of operational experience on research and development --- nuclear power plants
[EPRI-NP-1689-SR] N81-23397
Development of a computer-aided method for the techno-economic evaluation of R and D projects in the mining area. Stage 1: Development of the concept and identification of application
[BMFT-FB-T-80-130] N81-23969
Authorizing appropriations to the National Aeronautics and Space Administration for fiscal year 1982
[H-REPT-97-32] N81-23972
Research and technology developments in aeronautics, atmospheric and oceanographic measurements, radar applications, and remote sensing of insects using radar
[NASA-TM-73289] N81-23996

RESEARCH FACILITIES
First results from the Tromsoe ionospheric modification facility N81-23521
National Aeronautics and Space Administration Authorization Act, 1982
[S-REPT-97-100] N81-23973

RESEARCH MANAGEMENT
Methodology for urban rail and construction technology research and development planning
[NASA-CR-164280] N81-23975
RESERVES
Helium resources of the United States, 1979
[PB81-150146] N81-23582
RESERVOIRS
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553
Water resources data for Arkansas, water year 1979
[PB81-144842] N81-23579
Penetration of solar radiation in snow-ice covered water reservoirs: Winterkill
[PB81-149643] N81-23584
Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon
[PB81-151995] N81-23587
Review of the geothermal reservoir well stimulation program
[LA-UR-81-26] N81-23701
RESIDENTIAL ENERGY
The United States Air Force Academy solar energy research project: Solar test house
[AD-A097212] N81-23628
Winter experience of a passive solar retrofit
[DOE/CS-34127/1] N81-23630
Models for residential-and commercial-sector energy conservation analysis: Applications, limitations, and future potential
[DOE/PE-70044/T3] N81-23639
System integration issues of residential solar photovoltaic systems
[DOE/RA-29349/01] N81-23643
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678
Residential energy use and conservation actions: Analysis of disaggregate household data
[ORNL/CON-68] N81-23686
Regional comparisons of on-site solar potential in the residential and industrial sectors
[LBL-11789] N81-23695
Performance monitoring of ground-coupled solar-assisted heat pump systems
[EPRI-EM-1697] N81-23696
RESIDUAL STRESS
X-ray diffraction measurement of residual stress (strain): Energy dispersive X-ray residual stress measurement N81-23480
X-ray diffraction study of residual stress in model weldments
[UCRL-15332] N81-23504
RESOLUTION
Feasibility study of a microprocessor based oculometer system
[NASA-CR-164286] N81-23889
RESONANCE PROBES
Two-wavelength HeNe laser interferometer
[UCID-18988] N81-23456
RESOURCES
Wind energy resource atlas. Volume 9: The Southwest region --- Nevada and California
[PNL-3195WERA-9-VOL-9] N81-23634
RESOURCES MANAGEMENT
Coal resource information. Volume 1: Coal resource information requirements
[EPRI-EA-673-VOL-1] N81-23571
Ground water overdrafting must be controlled
[PB81-156135] N81-23589
RETORT PROCESSING
Development of a market methodology for assessing the impact of solar thermal-produced fuels and chemicals
[DOE/SF-12989/1] N81-23968
RETROFITTING
The United States Air Force Academy solar energy research project: Solar test house
[AD-A097212] N81-23628
Winter experience of a passive solar retrofit
[DOE/CS-34127/1] N81-23630
Residential energy use and conservation actions: Analysis of disaggregate household data
[ORNL/CON-68] N81-23686
REVERSE FIELD PINCH
Stable heating and burn simulations of a reversed-field pinch reactor
[COO-2218-189] N81-23918
REYNOLDS NUMBER
Experimental flutter at high subsonic speeds and its theoretical prediction, taking into account wing thickness and Reynolds number N81-23052
REYNOLDS STRESS
Prediction of the turbulent wake with second-order closure
[NASA-CR-164294] N81-23038
Mean-flow and turbulence measurements in the vicinity of the trailing edge of an NACA (63 sub 1)-012 airfoil
[NASA-TP-1845] N81-23410
RHENIUM COMPOUNDS
Infrared hole - Burning spectroscopy of matrix isolated ReO4(-) molecules N81-23447
RHEOLOGY
Rheology, flow and atomization of coal-oil mixtures N81-23404
RIBBONS
Defect structure of EFG silicon ribbon
[NASA-CR-164324] N81-23618
RICHARDSON NUMBER
Investigation of numerical modeling techniques for recirculations flows: Parts 1 and 2
[EPRI-CS-1665-PT-1] N81-23427
RIGID STRUCTURES
Unsteady transonic flow past airfoils in rigid body motion --- predicting aerodynamic forces for flutter analysis
[AD-A097142] N81-23041
A numerical treatment of the dynamic motion of a zero bending rigidity cylinder in a viscous stream
[AD-A097450] N81-23426
RIOMETERS
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754
RIVER BASINS
Development of a model for estimating the extent of river flooding with satellite and in situ data
[PB81-152035] N81-23588
RIVERS
Contributions to a thermodynamic model of Earth systems on rivers
[NASA-CR-164272] N81-23506
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780
ROBUSTNESS (MATHEMATICS)
Signal processing in an uncertain environment: Multivariate techniques of nonparametric and robust detection N81-23336
Properties of multivariable root loci
[NASA-CR-164319] N81-23829
ROCKET ENGINE DESIGN
Application of Symphonie experiences in follow-up projects at MBB N81-23163
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161760] N81-23184
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161759] N81-23185
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161748] N81-23186
ROCKET EXHAUST
Multinozzle plume flowfields
[AD-A097244] N81-23419
A summary of rocket-induced ionospheric perturbations N81-23522
ROCKET LAUNCHING
A summary of rocket-induced ionospheric perturbations N81-23522
ROLL FORMING
Cladding of metals to iron by vacuum rolling
[PB81-150096] N81-23476
ROLLER BEARINGS
NASA five-ball fatigue tester: Over 20 years of research
[NASA-TM-82589] N81-23462
Application of ion implantation for the improvement of localized corrosion resistance of M50 steel bearings
[AD-A097230] N81-23466
ROLLING CONTACT LOADS
NASA five-ball fatigue tester: Over 20 years of research
[NASA-TM-82589] N81-23462
Large and small deformation finite element analysis of rolling contact N81-23482
ROOFS
Thermal resistance measurements of a built-up roof system
[PB81-140063] N81-23332
ROOM TEMPERATURE
Experimental studies of partially defluidized bed with immersed heat exchange tubes N81-23407
ROOTS OF EQUATIONS
Properties of multivariable root loci
[NASA-CR-164319] N81-23829
ROTARY WING AIRCRAFT
Rotorcraft aviation icing research requirements: Research review and recommendations
[NASA-CR-165344] N81-23070
An evaluation of NASA's program for advancing rotorcraft technology
[PB81-144180] N81-23078
ROTARY WINGS
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies
[NASA-CR-152336-1] N81-23064
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065
Application of holography to the study of helicopter rotor flow fields
[NASA-CR-164293] N81-23433
ROTATING DISKS
Drag enhancement of microbial slime films on rotating discs
[AD-A097228] N81-23787
ROTORS
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies
[NASA-CR-152336-1] N81-23064
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065
ROUTES
Second derivative algorithms for minimum delay distributed routing in networks
[AD-A097623] N81-23835
RUBBER
Homogeneous and heterogeneous rubbery/rubbery diblock copolymers and polymer blends - A unified view
[AD-A097690] N81-23287
RUNGE-KUTTA METHOD
Analytical treatment of gravity effects on gas loaded variable conductance heat pipes
[AD-A097679] N81-23629
RUNWAY CONDITIONS
National runway friction measurement program
[AD-A097334] N81-23097
RUNWAYS
A microcomputer-based signal data converter for runway visual range measurements
[AD-A097568] N81-23060
National runway friction measurement program
[AD-A097334] N81-23097
RURAL AREAS
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
RURAL LAND USE
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
RUSTING
Mechanisms of erosion/corrosion of metals and their oxide scales --- coal gasification pilot plant components
[LBL-12023] N81-23255
RUTILE
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489

RYDBERG SERIES
Coherent transient effect studies of Rydberg atoms
[AD-A097588] N81-23207

S

S-N DIAGRAMS
Fatigue degradation in compressively loaded composite laminates --- graphite-epoxy composites
[NASA-CR-165681] N81-23192
SAFETY
Controlled burnout of wasted coal on abandoned coal mine lands
[PB81-148231] N81-23234
SAFETY FACTORS
Health and safety: Preliminary comparative assessment of the Satellite Power System (SPS) and other energy alternatives
[NASA-CR-164215] N81-23594
SALINITY
Underground residence times and chemical quality of basal groundwater in Pearl Harbor and Honolulu aquifers, Oahu, Hawaii
[PB81-135444] N81-23577
Physical environment of the Eastern Bering Sea, March 1979
[PB81-148496] N81-23786
SALTS
Experimental processing of salt slags from an aluminum dross furnace
[PB81-135022] N81-23264
SAMPLES
Empirical Bayes rules for selecting good populations
[AD-A097619] N81-23843
SAMPLING
Empirical Bayes rules for selecting good populations
[AD-A097619] N81-23843
Method for sampling from fission neutron energy spectra
[ORNL/TM-7631] N81-23884
SATELLITE ATTITUDE CONTROL
Stationkeeping experience with OTS N81-23143
SIRIO in-orbit control N81-23144
On-orbit control of the Communications Technology Satellite (CTS)/HERMES N81-23145
Methods and techniques used for Symphonie attitude determination and control N81-23148
SATELLITE CONFIGURATIONS
The Symphonie space segment N81-23105
SATELLITE CONTROL
Organization and operational configuration of the Symphonie ground control system N81-23146
In-orbit control of geostationary satellites. Panel discussion C N81-23151
SATELLITE DESIGN
The Symphonie space segment N81-23105
Summary of operating experience with the Symphonie satellites N81-23150
SATELLITE GROUND SUPPORT
Stationkeeping experience with OTS N81-23143
SIRIO in-orbit control N81-23144
Organization and operational configuration of the Symphonie ground control system N81-23146
Symphonie orbit: Determination and orbit; manoeuvre activities N81-23147
Summary of operating experience with the Symphonie satellites N81-23150
In-orbit control of geostationary satellites. Panel discussion C N81-23151
SATELLITE INSTRUMENTS
Performance of the main subsystems of the Symphonie satellites N81-23106
SATELLITE NETWORKS
Utilization analysis of the experimental satellite system Symphonie N81-23108
Experiments selected for the telecommunications test program of the German Post Office --- using symphonie N81-23109
Satellite telecommunications experiments project: An overview N81-23111
The Symphonie experiment in China N81-23112
Integration of satellite circuits in the terrestrial telecommunication network --- Symphonie satellite N81-23121
Analysis of brief duration losses and error structures in satellite links N81-23125
Computer networking experiment via the Symphonie satellite N81-23131
Market capture by 30/20 GHz satellite systems. Volume 1: Executive summary
[NASA-CR-165231] N81-23345
Market capture by 30/20 GHz satellite systems, volume 2
[NASA-CR-165232] N81-23346
The 30/20 GHz communications system functional reqirements
[NASA-CR-165301] N81-23347
SATELLITE OBSERVATION
On the use of off-nadir pointing for increased temporal resolution of Earth observing satellite systems
[NASA-TM-82139] N81-23175
Ionospheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760
SATELLITE POWER TRANSMISSION (TO EARTH)
Health and safety: Preliminary comparative assessment of the Satellite Power System (SPS) and other energy alternatives
[NASA-CR-164215] N81-23594
Satellite Power Systems (SPS) concept definition study (Exhibit D). Volume 7: System/subsystems requirements databook
[NASA-CR-3399] N81-23595
Satellite Power Systems (SPS) concept definition study, exhibit F
[NASA-CR-161750] N81-23599
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692
SATELLITE SOLAR ENERGY CONVERSION
Satellite Power Systems (SPS) concept definition study, exhibit F
[NASA-CR-161750] N81-23599
SATELLITE TELEVISION
Experimental operation of a digital video transmission system --- Symphonie N81-23127
Digital television transmission experiment via Symphonie N81-23128
Outcome of Symphonie experiments in Ivory Coast N81-23155
The .French German broadcasting satellite program N81-23170
Symphonie experience and selection of broadcasting standards for direct broadcasting satellite systems N81-23171
SATELLITE TRACKING
Step tracking system --- for Symphonie N81-23141
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142
SATELLITE TRANSMISSION
Experiments selected for the telecommunications test program of the German Post Office --- using symphonie N81-23109
The Symphonie experiment in China N81-23112
Transmission of TDMA signals at 60 Mbit/s in the Symphonie system N81-23113
Results of the 60 Mbit/s TDMA system. Tests via Symphonie N81-23114
Experiments with a long time delay phase-locked loop via the satellite Symphonie N81-23124
Analysis of brief duration losses and error structures in satellite links N81-23125
Propagation effects in high latitudes --- Intelsat and Symphonie transmissions N81-23132
Signal fluctuations observed during the Symphonie experiment N81-23133
Two-way time transfers between National Research Council (Ottawa) and Paris Observatory via the Symphonie satellite N81-23134
Satellite transmission serving radio and television --- Symphonie experiments N81-23152
Satellites and communications: Transmissions between France and Quebec via Symphonie N81-23153
Transmission parameters of FDM/FM/FDMA telephone and FM television for domestic satellite system in China based on the experiment results via Symphonie N81-23164
Digital transmission tests of multiplexed video and audio signals at 60 Mbit/s via Orbital Test Satellite (OTS)
[BBC-RD-1980/16] N81-23342
Database searching and document delivery via communications satellite
[AIP-80-1] N81-23944
SATELLITE-BORNE PHOTOGRAPHY
Development of a model for estimating the extent of river flooding with satellite and in situ data
[PB81-152035] N81-23588
SATELLITE-BORNE RADAR
Feasibility study of satellite-borne lidar global wind monitoring system, part 2
[PB81-145369] N81-23781
SATURN (PLANET)
Status and future of extraterrestrial mapping programs
[NASA-CR-3390] N81-23989
SCALE (CORROSION)
Mechanisms of erosion/corrosion of metals and their oxide scales --- coal gasification pilot plant components
[LBL-12023] N81-23255
SCALE EFFECT
Experimental studies of scale effects on oscillating airfoils at transonic speeds N81-23054
SCALING LAWS
Coal combustion aerothermochemistry research
[DOE/ER-10029/T1] N81-23216
Compressible turbulent boundary layer interaction experiments
[NASA-CR-164292] N81-23415
SCANNING
Effects of curved approach paths and advanced displays on pilot scan patterns
[NASA-TP-1846] N81-23791
SCATTERING
An experimental comparison of pumped superluminal electromagnetic radiation to Cerenkov radiation
[AD-A097571] N81-23361
SCATTERING COEFFICIENTS
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, summer, 1978
[AD-A097134] N81-23749
SCATTERING CROSS SECTIONS
Raman scattering by a molecule adsorbed at the surface of a thin metallic film
[IS-T-922] N81-23873
SCENE ANALYSIS
Reconnaissance Sensor System exploitation
[AD-A097224] N81-23567
Sensor image prediction techniques
[AD-A097638] N81-23895
SCHEDULING
An analysis of opportunistic maintenance policy for the F100PW100 aircraft engine
[AD-A097548] N81-23025
DSN scheduling system N81-24016
SCHOTTKY DIODES
Extremely uniform electrodeposition of submicron Schottky contacts
[AD-A097657] N81-23385
Development of polycrystal GaAs solar cells
[SERI/PR-8032-1-T1] N81-23660
SCHROEDINGER EQUATION
Extended rate equations
[UCID-18932] N81-23879
SCIENTISTS
Role of military scientists and engineers in space (1980-2000)
[LA-UR-81-192] N81-23173
SCINTILLATION
Atmospheric optical propagation comparisons during MAGAT-80
[AD-A097274] N81-23752
SCOUT LAUNCH VEHICLE
Scout/Navy transit improvement program (NOVA-1) launch
[NASA-TM-82350] N81-23177
SCRAP
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267
Silver recovery from aircraft scrap
[PB81-150021] N81-23269
SEA ICE
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565

Physical environment of the Eastern Bering Sea, March 1979
[PB81-148496] N81-23786
SEA TRUTH
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553
SEA WATER
Flux of energy and essential elements through the continental shelf ecosystem
[DOE/EV-00639/22] N81-23728
SEALING
Glass ceramics for sealing to high-thermal-expansion metals
[SAND-80-2192] N81-23297
SEARCH PROFILES
Database searching and document delivery via communications satellite
[AIP-80-1] N81-23944
Introduction of on-line searching in information services N81-23962
SEARCH RADAR
Environment-adaptive radar techniques
[AD-A097262] N81-23351
SEASAT PROGRAM
An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery
[NASA-CR-164279] N81-23562
SEATS
Study to develop improved fire resistant aircraft passenger seat materials
[NASA-CR-152408] N81-23058
SEDIMENTS
In-situ measurement of soil properties
[PB81-130064] N81-23328
Holding capacity of plate anchors
[AD-A097116] N81-23467
Contributions to a thermodynamic model of Earth systems on rivers
[NASA-CR-164272] N81-23506
Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585
Geological factors related to characteristics of seafloor manganese nodule deposits
[PB81-145831] N81-23758
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785
SEISMOLOGY
Long-term measurements of ground motions offshore
[SAND-80-2718C] N81-23756
SELECTIVE DISSEMINATION OF INFORMATION
Defense SDI: A useful current awareness system
[AD-A097084] N81-23946
SELECTORS
Signal selector, spectrum receivers and touch panel control for the SATCOM signal analyzer
[AD-A097532] N81-23360
SEMANTICS
Procedural semantics as a theory of meaning
[AD-A097630] N81-23815
SEMICONDUCTING FILMS
Low cost sprayed CdTe solar cell research
[SERI/PR-8104-3-T1] N81-23659
SEMICONDUCTOR DEVICES
Demonstration of Pulsed Electron Beam Applications (PEBA) for fabricating small geometry semiconductor devices
[AD-A097547] N81-23382
Extremely uniform electrodeposition of submicron Schottky contacts
[AD-A097657] N81-23385
Semiconductor processing by electron beam pulse-induced surface reactions
[PB81-148579] N81-23401
Thin film optical devices and quantum electronics
[AD-A097246] N81-23450
Laser assisted semiconductor device processing
[AD-A097427] N81-23452
Semiconductor detectors for medical tomography with high-energy heavy ions
[LBL-11037] N81-23790
SEMICONDUCTOR JUNCTIONS
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
SEMICONDUCTORS (MATERIALS)
Materials processing threshold report. 1: Semiconductor crystals for infrared detectors
[NASA-CR-161752] N81-23100
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262
The use of microwaves to characterize optically stimulated semiconductors N81-23374
CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683
SENSITIVITY
On sensitivity analysis in systems for planning and decision support
[AD-A097409] N81-23940
SENSORIMOTOR PERFORMANCE
Effects of curved approach paths and advanced displays on pilot scan patterns
[NASA-TP-1846] N81-23791
SENSORY PERCEPTION
Effects of curved approach paths and advanced displays on pilot scan patterns
[NASA-TP-1846] N81-23791
SEPARATED FLOW
Topology of three-dimensional separated flows
[NASA-TM-81294] N81-23037
An assessment of theoretical models for viscous and transonic flow N81-23046
Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051
SEPARATORS
Inexpensive cross-linked polymeric separators made from water soluble polymers
[NASA-TM-82619] N81-23205
Processing equipment for resource recovery systems. Volume 2: Magnetic separators, air classifier and ambient air emissions tests
[PB81-141590] N81-23324
A continuous dielectric separator for mineral beneficiation
[PB81-135014] N81-23581
Hot-gas desulfurization. 1: Use of gasifier ash in a fixed-bed process
[DOE/ET-10463/T1-VOL-1] N81-23716
SEQUENTIAL CONTROL
GPSAP/V2 with applications to open-cycle MHD systems
[ANL/MHD-80-15] N81-23908
SERVICE LIFE
An analysis of opportunistic maintenance policy for the F100PW100 aircraft engine
[AD-A097548] N81-23025
Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619
SERVICES
Studies and experiments by Eurospace in the field of education and public service --- Symphonie and third world countries N81-23154
SET THEORY
Terms and axioms for a theory of human-machine systems N81-23796
Multiple objective evaluation and choicemaking under risk with partial preference infomation
[AD-A097418] N81-23941
SEWAGE
Evaluation of hot acid treatment for municipal sludge conditioning
[PB81-144446] N81-23982
Recycling of sewage effluent by sugarcane irrigation: A dilution study, October 1976 to October 1978, Phase 2-A
[PB81-144669] N81-23983
SH-3 HELICOPTER
An analysis of thermal balance in the cooled cabin of a Sea King Helicopter
[AD-A097199] N81-23077
SHAFTS (MACHINE ELEMENTS)
Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel
[NASA-TM-81285] N81-23039
SHALE OIL
Refining and upgrading of synfuels from coal and oilshales by advanced catalytic processes
[FE-2315-58] N81-23311
Development of a market methodology for assessing the impact of solar thermal-produced fuels and chemicals
[DOE/SF-12989/1] N81-23968
SHALES
Analysis of the structural parameters that influence gas production from the Devonian shale, volume 1
[DOE/ET-12138/T1-VOL-1] N81-23318
SHAPE MEMORY ALLOYS
Shape-casting titanium in olivine, garnet, chromite, and zircon rammed and shell molds
[PB81-147274] N81-23475
SHEAR FLOW
Fundamental research in turbulent modeling. Part 1: Theory. Part 2: Experiment
[AD-A097431] N81-23425
Investigation of numerical modeling techniques for recirculations flows: Parts 1 and 2
[EPRI-CS-1665-PT-1] N81-23427
SHEAR PROPERTIES
Manufacturing process feasibility study
[UCRL-15319] N81-23251
SHEAR STRENGTH
Cladding of metals to iron by vacuum rolling
[PB81-150096] N81-23476
SHEAR STRESS
Creep and creep rupture of laminated graphite/epoxy composites
[NASA-CR-164297] N81-23193
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters
[ISSN-0077-5606] N81-23412
Machining with a round-nosed form tool N81-23457
SHIP HULLS
Drag enhancement of microbial slime films on rotating discs
[AD-A097228] N81-23787
SHOCK DISCONTINUITY
Kinetic theory and turbulent discontinuities --- shock tube flow
[NASA-CR-164287] N81-23413
SHOCK LOADS
Structure response and damage produced by airblast form surface mining
[PB81-148918] N81-23593
SHOCK SPECTRA
Shock spectrum calculation from acceleration time histories
[AD-A097162] N81-23755
SHOCK TUBES
Kinetic theory and turbulent discontinuities --- shock tube flow
[NASA-CR-164287] N81-23413
SHOCK WAVES
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056
Analytic model and numerical simulation of shock wave propagation into a reentrant corner
[AD-A097471] N81-23423
Finite elements for fluid dynamics
[AD-A097215] N81-23424
Structure response and damage produced by airblast form surface mining
[PB81-148918] N81-23593
SHORELINES
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
A general inverse solution for 2D edge waves
[AD-A097683] N81-23748
SHORT TAKEOFF AIRCRAFT
Application of variable structure system theory to aircraft flight control --- AV-8A and the Augmentor Wing Jet STOL Research Aircraft
[NASA-CR-164321] N81-23093
SIDE-LOOKING RADAR
Computer simulation of human performance in electronic processed imagery systems
[AD-A097622] N81-23801
SIDELOBE REDUCTION
Satellite Power Systems (SPS) concept definition study, exhibit F
[NASA-CR-161750] N81-23599
SIGNAL ANALYSIS
Carrier frequency stability and its effect on phase shift keying signals in the satellite channel --- Symphonie satellite N81-23123
Signal processing in an uncertain environment: Multivariate techniques of nonparametric and robust detection N81-23336

Signal selector, spectrum receivers and touch panel control for the SATCOM signal analyzer
[AD-A097532] N81-23360
Development of the TEST UNIT for the SATCOM signal analyzer
[AD-A097666] N81-23363
Minimum-cross-entropy spectral analysis of multiple signals
[AD-A097531] N81-23384

SIGNAL ANALYZERS
Signal selector, spectrum receivers and touch panel control for the SATCOM signal analyzer
[AD-A097532] N81-23360
Development of the TEST UNIT for the SATCOM signal analyzer
[AD-A097666] N81-23363

SIGNAL DETECTION
Signal processing in an uncertain environment: Multivariate techniques of nonparametric and robust detection N81-23336

SIGNAL DISTORTION
End-to-end quality measure for transmission of compressed imagery over a noisy coded channel N81-24007

SIGNAL FADING
Propagation effects in high latitudes --- Intelsat and Symphonie transmissions N81-23132
Signal fluctuations observed during the Symphonie experiment N81-23133

SIGNAL MEASUREMENT
Tests and results of integrated TV sound transmission --- Symphonie satellites N81-23129

SIGNAL PROCESSING
A microcomputer-based signal data converter for runway visual range measurements
[AD-A097568] N81-23060
Signal processing in an uncertain environment: Multivariate techniques of nonparametric and robust detection N81-23336
Maximum entropy image estimation analysis of image formation with thinned random arrays
[AD-A097357] N81-23349
New techniques in digital signal processing for synthetic aperture radar
[AD-A097279] N81-23365
Suppression of narrowband interference in pseudo-noise spread spectrum systems
[AD-A097336] N81-23368
Automatic methods in image processing and their relevance to map-making
[AD-A097377] N81-23566
CCD multi-level logic --- signal processing applications
[AD-A097586] N81-23816
Recursive least squares with linear constraints
[UCRL-85330] N81-23837
Feasibility study of a microprocessor based oculometer system
[NASA-CR-164286] N81-23889
High speed front end of the multimegabit telemetry demodulator detector N81-24005
The reliability of multistate, multioutput systems N81-24011
New results on antenna arraying, part 1 N81-24012

SIGNAL RECEPTION
Two-way time transfers between National Research Council (Ottawa) and Paris Observatory via the Symphonie satellite N81-23134

SIGNAL TO NOISE RATIOS
Degradation of the performance of communication systems in the presence of interference
[AD-A097685] N81-23369

SIGNAL TRANSMISSION
Two-way time transfers between National Research Council (Ottawa) and Paris Observatory via the Symphonie satellite N81-23134
A four-way distribution amplifier for reference signal distribution N81-24003
End-to-end quality measure for transmission of compressed imagery over a noisy coded channel N81-24007

SILICON
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613
The establishment of a production-ready manufacturing process utilizing thin silicon substrates for solar cells
[NASA-CR-164327] N81-23615
Defect structure of EFG silicon ribbon
[NASA-CR-164324] N81-23618
The effect of minority carrier mobility variations on solar cell spectral response
[NASA-TM-82604] N81-23625

SILICON COMPOUNDS
Shape-casting titanium in olivine, garnet, chromite, and zircon rammed and shell molds
[PB81-147274] N81-23475

SILICON FILMS
Demonstration of Pulsed Electron Beam Applications (PEBA) for fabricating small geometry semiconductor devices
[AD-A097547] N81-23382
Influence of grain boundaries on the electrical properties of polycrystalline-silicon films
[DOE/ER-02899/T2] N81-23933

SILICON NITRIDES
Semiconductor processing by electron beam pulse-induced surface reactions
[PB81-148579] N81-23401

SILICON OXIDES
Semiconductor processing by electron beam pulse-induced surface reactions
[PB81-148579] N81-23401

SILICON TETRACHLORIDE
Chlorination of fly ash and bentonite with a gas mixture of silicon tetrachloride and chrlorine
[IS-T-920] N81-23724

SILICONES
Effect of vinyl and phenyl contents of silicone gum on the properties of the elastomers and cellular silicone cushions
[UCRL-53105] N81-23298

SILVER
Chemical diffusion on solid surfaces
[COO-4220-4] N81-23224
Silver recovery from aircraft scrap
[PB81-150021] N81-23269

SIMULATION
Cumulative annoyance due to multiple aircraft flyover with differing peak noise levels
[NASA-CR-3417] N81-23712

SIMULATORS
Design, development, and evaluation of lightweight hydraulic system, phase 1 --- A-7 aircraft
[AD-A097505] N81-23075
High-temperature turbine technology program turbine simulator tests with coal-derived low-Btu gas fuel
[FE-1806-92] N81-23473

SINGLE CHANNEL PER CARRIER TRANSMISSION
Single Channel Per Carrier (SCPC) scheme for remote area telephony --- equipment testing, using Symphonie N81-23118
Single Channel Per Carrier (SCPC) scheme: Delta modulation. Experimental Results --- Symphonie satellites N81-23119
Single Channel Per Carrier (SCPC)-FM system N81-23120

SINGLE CRYSTALS
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652
Crystallite sizes in polyethylene single crystals and melt-crystallized polyethylene samples N81-23923

SIRIO SATELLITE
SIRIO in-orbit control N81-23144

SITE SELECTION
Direct application of geothermal energy at the L'eggs Product Plant, Las Cruses, New Mexico
[DOE/ID-12047/3] N81-23636
Advanced system demonstration for utilization of biomass as an energy source. Site study report --- site selection in Maine
[DOE/ET-20055/T1] N81-23662
Environmental issues and site selection criteria for small hydropower projects in developing countries
[ORNL/TM-7620] N81-23720
Exploratory benefit-cost analysis of environmental controls on hydrothermal energy
[PNL-3527] N81-23725
Meteorological and air quality data report. WIPP site: Eddy County, New Mexico --- radioactive waste disposal site selection
[SAND-81-7052] N81-23779
Physical oceanographic data from the OTEC Punta Tuna, Puerto Rico site, September 1979 - June 1980
[LBL-12327] N81-23784

SKIN (STRUCTURAL MEMBER)
Structural design of BFRP patches for Mirage wing repair
[AD-A097195] N81-23024
A comparison of laboratory measured temperatures with predictions for a spar/skin type aircraft structure
[NASA-TM-81359] N81-23067

SKIN FRICTION
Topology of three-dimensional separated flows
[NASA-TM-81294] N81-23037
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters
[ISSN-0077-5606] N81-23412

SLAGS
Experimental processing of salt slags from an aluminum dross furnace
[PB81-135022] N81-23264
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299

SLENDER WINGS
Experimental flutter at high subsonic speeds and its theoretical prediction, taking into account wing thickness and Reynolds number N81-23052

SLIDING FRICTION
Laboratory investigation of water-lubricated elastomeric bearings
[AD-A097109] N81-23464

SLUDGE
Evaluation of hot acid treatment for municipal sludge conditioning
[PB81-144446] N81-23982

SLUMPING
Experimental studies of partially defluidized bed with immersed heat exchange tubes N81-23407

SMALL PERTURBATION FLOW
Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051
Experimental flutter at high subsonic speeds and its theoretical prediction, taking into account wing thickness and Reynolds number N81-23052

SNOW
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
Penetration of solar radiation in snow-ice covered water reservoirs: Winterkill
[PB81-149643] N81-23584

SODIUM SULFATES
Combustion system processes leading to corrosive deposits
[NASA-TM-81752] N81-23243

SOIL MECHANICS
In-situ measurement of soil properties
[PB81-130064] N81-23328
Shaft design in the Coeur d'Alene Mining District, Idaho: Results of in situ stress and physical property measurements
[PB81-148199] N81-23591

SOIL MOISTURE
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544

SOIL SCIENCE
Construction procedures using self hardening fly ash
[PB81-153884] N81-23334

SOILS
Soils of Israel and their similarity to soils of the United States
[AD-A097528] N81-23564

SOLAR ARRAYS
A Module Experimental Process System Development Unit (MEPSDU) --- development of low cost solar arrays
[NASA-CR-164325] N81-23616
Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621

Detection of electrically failed photovoltaic modules at MIT LL test sites
[DOE/ET-20279/112] N81-23650
Economic analysis of the unified heliostat array
[DOE/SF-10802/1] N81-23657
Block 5 solar cell module: Design and test specification for intermediate-load applications, 1981
[DOE/CS-31037/T1] N81-23693

SOLAR CELLS
Development of photoelectrochemical cells based on compound semiconductors and nonaqueous electrolytes
[SERI/PR-8002-7-T1] N81-23214
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613
The establishment of a production-ready manufacturing process utilizing thin silicon substrates for solar cells
[NASA-CR-164327] N81-23615
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621
Analysis and evaluation in the production process and equipment area of the low-cost solar array project
[DOE/JPL-954796-81/12] N81-23622
The effect of minority carrier mobility variations on solar cell spectral response
[NASA-TM-82604] N81-23625
Performance of high resistivity n+pp+ silicon solar cells under 1 MeV electron irradiation
[NASA-TM-82610] N81-23626
Reduced annealing temperatures in silicon solar cells
[NASA-TM-82597] N81-23627
Thin films of InP for photovoltaic energy conversion
[COO-3004-4] N81-23632
High efficiency thin film CdTe solar cells
[SERI/PR-9133-1-T1] N81-23641
Materials for high efficiency monolithic multigap concentrator solar cells
[SERI/TR-8081-1-T3] N81-23646
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652
Low cost sprayed CdTe solar cell research
[SERI/PR-8104-3-T1] N81-23659
Development of polycrystal GaAs solar cells
[SERI/PR-8032-1-T1] N81-23660
Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661
CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683
CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684
Block 5 solar cell module: Design and test specification for intermediate-load applications, 1981
[DOE/CS-31037/T1] N81-23693
Sequential purification and crystal growth for the production of low cost silicon substrates
[DOE/SERI-8119/3-4] N81-23930

SOLAR COLLECTORS
Assessment of existing studies of wind loading on solar collectors
[SERI/TR-632-812] N81-23501
Wind loading on tracking and field-mounted solar collectors
[SERI/TP-632-958] N81-23502
High temperature solar receiver
[NASA-CR-164332] N81-23614
Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617
Design, fabrication, and bench testing of a solar chemical receiver
[NASA-CR-164333] N81-23620
Advanced solar concentrator: Preliminary and detailed design
[NASA-CR-164316] N81-23623
Advanced solar concentrator: Executive summary
[NASA-CR-164318] N81-23624
Winter experience of a passive solar retrofit
[DOE/CS-34127/1] N81-23630
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary
[SAN-0307-1-VOL-1] N81-23671
Solar Thermal Enhanced Oil Recovery (STEOR), volume 2, sections 2-8
[SAN-0307-1-VOL-2] N81-23672
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 2: Appendices
[SAN-0307-1-VOL-2-APP] N81-23673
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility
[SAN-0307-1-VOL-3] N81-23674
Midtemperature solar systems test facility predictions for thermal performance based on test data: Solar kinetics T-600 solar collector with FEK 244 reflector surface
[SAND-80-1964/9] N81-23675
Economic assessment of advanced central-receiver solar-thermal power system. Executive summary
[DOE/SF-10601/T1] N81-23680
Economic assessment of advanced central-receiver solar-thermal power systems
[DOE/SF-10601/1] N81-23681
Economic assessment of advanced central-receiver solar-thermal power systems: PG and E assessment
[DOE/SF-10601/2] N81-23682
Solar energy systems: Standards for cover plates for flat plate solar collectors
[PB81-147290] N81-23709

SOLAR COOLING
Solar heating and cooling system installed at RKL Controls Company, Lumberton, New Jersey
[NASA-CR-161679] N81-23597
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604
Solar heating and hot water system installed at Charlotte Memorial Hospital, Charlotte, North Carolina
[NASA-CR-161731] N81-23606
Performance of active solar space-cooling systems: The 1980 cooling season
[SOLAR/0023-81/40] N81-23647
Active solar heating and cooling information user study
[SERI/TR-751-747] N81-23691
Assessment of the solar heating and cooling in residential building demonstration program
[DOE/PE-70278/T10] N81-23698

SOLAR CYCLES
Prediction techniques for forthcoming solar maxima N81-23536

SOLAR ECLIPSES
Astronomical programs: A canon of solar eclipses for the years -1500 to -1000
[PB81-133555] N81-23988

SOLAR ENERGY
Hollow-fiber membranes for photosensitized electron transport
[LBL-12359] N81-23220
Solar energy system economic evaluation for Wormser Columbia, South Carolina
[NASA-CR-161722] N81-23605
Solar energy system economic evaluation for Colt Pueblo, Pueblo, Colorado
[NASA-CR-161725] N81-23607
Access to solar energy: The problem and its current status
[SAND-80-7081] N81-23635
Financial study of commercialization of solar central receiver power systems
[DOE/SF-11421/1] N81-23640
Solar enhanced oil recovery: A potential early market for industrial solar energy
[SAND-80-1869C] N81-23702
Development of a market methodology for assessing the impact of solar thermal-produced fuels and chemicals
[DOE/SF-12989/1] N81-23968

SOLAR ENERGY CONVERSION
Magnetic-field effects on photosensitized electron transfer reactions
[LBL-12361] N81-23222
Corrosion Research Center of the University of Minnesota
[DOE/ER-10450/1] N81-23294
Photovoltaics Program Utility Interface Southwest Regional Workshop Proceedings
[NASA-CR-164284] N81-23601
Winter experience of a passive solar retrofit
[DOE/CS-34127/1] N81-23630
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
Solar passive ceiling system
[DOE/R5-10148/2] N81-23637
System integration issues of residential solar photovoltaic systems
[DOE/RA-29349/01] N81-23643
Materials for high efficiency monolithic multigap concentrator solar cells
[SERI/TR-8081-1-T3] N81-23646
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Economic assessment of advanced central-receiver solar-thermal power systems
[DOE/SF-10601/1] N81-23681
Biomass energy systems information user study
[SERI/TR-751-748] N81-23690
Regional comparisons of on-site solar potential in the residential and industrial sectors
[LBL-11789] N81-23695
Performance monitoring of ground-coupled solar-assisted heat pump systems
[EPRI-EM-1697] N81-23696
The Coolidge Solar Irrigation Project
[SAND-80-2378] N81-23705
Assessment of nickel-hydrogen batteries for terrestrial solar applications
[SAND-80-7191] N81-23706

SOLAR FLUX
Relations between solar flux and E-region parameters N81-23525

SOLAR GENERATORS
High temperature solar receiver
[NASA-CR-164332] N81-23614
Solar thermal electric power information user study
[SERI/TR-751-750] N81-23689

SOLAR HEATING
Solar heating and cooling system installed at RKL Controls Company, Lumberton, New Jersey
[NASA-CR-161679] N81-23597
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604
Solar energy system economic evaluation for Wormser Columbia, South Carolina
[NASA-CR-161722] N81-23605
Solar heating and hot water system installed at Charlotte Memorial Hospital, Charlotte, North Carolina
[NASA-CR-161731] N81-23606
Solar energy system economic evaluation for Colt Pueblo, Pueblo, Colorado
[NASA-CR-161725] N81-23607
The United States Air Force Academy solar energy research project: Solar test house
[AD-A097212] N81-23628
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary
[SAN-0307-1-VOL-1] N81-23671
Solar Thermal Enhanced Oil Recovery (STEOR), volume 2, sections 2-8
[SAN-0307-1-VOL-2] N81-23672
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 2: Appendices
[SAN-0307-1-VOL-2-APP] N81-23673
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility
[SAN-0307-1-VOL-3] N81-23674
Active solar heating and cooling information user study
[SERI/TR-751-747] N81-23691
Performance monitoring of ground-coupled solar-assisted heat pump systems
[EPRI-EM-1697] N81-23696
Assessment of the solar heating and cooling in residential building demonstration program
[DOE/PE-70278/T10] N81-23698

SOLAR HOUSES
The United States Air Force Academy solar energy research project: Solar test house
[AD-A097212] N81-23628

SOLAR PHYSICS
Solar Terrestrial programs: A five year plan
[NASA-TM-82351] N81-23992
SOLAR POWER SATELLITES
The utilization of nonterrestrial materials --- resources for solar power satellite construction
[NASA-TM-83106] N81-23099
SOLAR RADIATION
Penetration of solar radiation in snow-ice covered water reservoirs: Winterkill
[PB81-149643] N81-23584
SOLAR RADIO EMISSION
Solar-geophysical data number 433. Part 2: (Comprehensive Reports) Data for August 1980, July 1980, March 1980, and miscellanea
[PB81-145286] N81-23994
Solar-geophysical data number 433. Part 1: (Prompt Reports) Data for August 1980, July 1980, March 1980 and late data
[PB81-145278] N81-23995
SOLAR SPECTRA
The solar ultraviolet source for the ionosphere and its variation N81-23508
Solar extinction radiometry
[NASA-CR-164290] N81-23993
SOLAR TERRESTRIAL INTERACTIONS
Relations between solar flux and E-region parameters N81-23525
On the morphology of the polar thermosphere N81-23528
Solar Terrestrial programs: A five year plan
[NASA-TM-82351] N81-23992
SOLAR TOTAL ENERGY SYSTEMS
The Coolidge Solar Irrigation Project
[SAND-80-2378] N81-23705
SOLAR WIND
The physical basic of the ionosphere in the solar-terrestrial system
[AGARD-CP-295] N81-23507
Solar radiations and their interactions with the terrestrial environment N81-23509
The effects of auroral activity on the midlatitude ionosphere N81-23517
Evaluation of magnetic helicity in homogeneous turbulence
[NASA-TM-82131] N81-23900
SOLID PROPELLANTS
Heat sterilizable solid-propellant development
[NASA-CR-164281] N81-23300
SOLID ROCKET PROPELLANTS
Dynamic burning effects in the combustion of solid propellants with cracks, and the use of granular bed combustion models
[AD-A097474] N81-23302
SOLID STATE
Solid-state displacement reactions between iron and nickel oxide at 1000 C N81-23240
SOLID SUSPENSIONS
Microscopic approach to transport in two-phase random media N81-23408
SOLID WASTES
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267
Development of analytical reference materials for refuse-derived fuels
[PB81-135030] N81-23323
SOLVENTS
Intramolecular flexibility of relatively rigid polymers, and intermolecular interactions in ordered polymer systems, part 2
[AD-A097424] N81-23284
SONOGRAMS
Effects of surface-mapping corrections and synthetic-aperture focusing techniques on ultrasonic imaging
[EGG-FM-5314] N81-23865
SOOT
Particulate processes in pulverized coal flames
[DOE/PC-30300/T2] N81-23218
SORGHUM
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
SOUND PROPAGATION
A note on sound radiation into a uniformly flowing fluid
[NASA-CR-166177] N81-23861
SOUND TRANSMISSION
Tests and results of integrated TV sound transmission --- Symphonie satellites N81-23129
Television with multiple audio facility using time division multiplexing --- Symphonie satellites N81-23130
SOUND WAVES
Development of nondestructive evaluation techniques for high-temperature ceramic heat exchanger components
[ANL-80-123] N81-23292
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T2] N81-23460
Preliminary investigation of acoustic oscillations in an H2-O2 fired Hall generator
[NASA-TM-81756] N81-23610
SOUTH CAROLINA
Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585
SOUTH DAKOTA
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
SOYBEANS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
SPACE COMMUNICATION
Development of infrared and microwave techniques for cloud parameter inference from satellite imagery and sounder data
[AD-A097592] N81-23770
SPACE COOLING (BUILDINGS)
Performance of active solar space-cooling systems: The 1980 cooling season
[SOLAR/0023-81/40] N81-23647
Microprocessor control of a ground water heat pump
[DOE/R5-10149/2] N81-23658
Assessment of the solar heating and cooling in residential building demonstration program
[DOE/PE-70278/T10] N81-23698
SPACE HEATING (BUILDINGS)
Calculating building heating and cooling loads using the frequency response of multilayered slabs
[AD-A097597] N81-23326
The United States Air Force Academy solar energy research project: Solar test house
[AD-A097212] N81-23628
Solar passive ceiling system
[DOE/R5-10148/2] N81-23637
Microprocessor control of a ground water heat pump
[DOE/R5-10149/2] N81-23658
Performance monitoring of ground-coupled solar-assisted heat pump systems
[EPRI-EM-1697] N81-23696
Assessment of the solar heating and cooling in residential building demonstration program
[DOE/PE-70278/T10] N81-23698
SPACE INDUSTRIALIZATION
The utilization of nonterrestrial materials --- resources for solar power satellite construction
[NASA-TM-83106] N81-23099
SPACE NAVIGATION
Existence and uniqueness of solutions to a class of nonlinear-operator-differential equations arising in automated spaceship navigation
[NASA-TP-1860] N81-23182
SPACE OBSERVATIONS (FROM EARTH)
High resolution imaging of space objects --- observing binary stars from Earth
[AD-A097359] N81-23894
SPACE POWER REACTORS
Space nuclear safety and fuel program
[LA-8749-PR] N81-23189
SPACE PROCESSING
Materials processing threshold report. 1: Semiconductor crystals for infrared detectors
[NASA-CR-161752] N81-23100
Evaluation of engineered foods for Closed Ecological Life Support System (CELSS)
[NASA-CR-160952] N81-23800
SPACE PROGRAMS
Authorizing appropriations to the National Aeronautics and Space Administration for fiscal year 1982
[H-REPT-97-32] N81-23972
SPACE SHUTTLE ORBITER 101
Comparison of theoretical predictions of orbiter airloads with wind tunnel and flight test results for a Mach number of 0.52
[NASA-TM-81358] N81-23066
SPACE SHUTTLE ORBITERS
Aboard the space shuttle
[NASA-EP-169] N81-23179
SUMS preliminary design and data analysis development --- shuttle upper atmosphere mass spectrometer experiment
[NASA-CR-165696] N81-23181
SPACE SHUTTLE PAYLOADS
Role of military scientists and engineers in space (1980-2000)
[LA-UR-81-192] N81-23173
SPACE SHUTTLES
STS-1 Mission Assessment
[NASA-TM-82348] N81-23180
An analytical procedure and automated computer code used to design model nozzles which meet MSFC base pressure similarity parameter criteria --- space shuttle
[NASA-CR-161757] N81-23187
SPACE TRANSPORTATION SYSTEM
Role of military scientists and engineers in space (1980-2000)
[LA-UR-81-192] N81-23173
Aboard the space shuttle
[NASA-EP-169] N81-23179
SPACE TRANSPORTATION SYSTEM 1 FLIGHT
STS-1 Mission Assessment
[NASA-TM-82348] N81-23180
Research study: STS-1 Orbiter Descent
[NASA-CR-161754] N81-23763
SPACEBORNE EXPERIMENTS
SUMS preliminary design and data analysis development --- shuttle upper atmosphere mass spectrometer experiment
[NASA-CR-165696] N81-23181
SPACECRAFT CABINS
Aboard the space shuttle
[NASA-EP-169] N81-23179
SPACECRAFT COMMUNICATION
Highly mobile Earth stations --- Antenna design and packaging N81-23139
The 30/20 GHz communications system functional reqirements
[NASA-CR-165301] N81-23347
Signal selector, spectrum receivers and touch panel control for the SATCOM signal analyzer
[AD-A097532] N81-23360
Frequency receiver development for the satellite communications (SATCOM) signal analyzer
[AD-A097664] N81-23362
Development of the TEST UNIT for the SATCOM signal analyzer
[AD-A097666] N81-23363
SPACECRAFT CONTROL
Existence and uniqueness of solutions to a class of nonlinear-operator-differential equations arising in automated spaceship navigation
[NASA-TP-1860] N81-23182
SPACECRAFT INSTRUMENTS
SUMS preliminary design and data analysis development --- shuttle upper atmosphere mass spectrometer experiment
[NASA-CR-165696] N81-23181
A solid-state digital temperature recorder for space use
[NASA-TM-81267] N81-23434

SPACECRAFT LAUNCHING
INTELSAT V-B (F-1) launch
[NASA-TM-82349] N81-23176
SPACECRAFT MANEUVERS
Symphonie orbit: Determination and orbit; manoeuvre activities N81-23147
SPACECRAFT MODELS
Pioneer Venus probe models instrumented prop tests
[NASA-CR-164298] N81-23174
SPACECRAFT PERFORMANCE
Performance of the main subsystems of the Symphonie satellites N81-23106
Symphonie: In-flight performance of telemetry-telecommand, power supply, thermal control and transponder subsystems N81-23149
SPACECRAFT STABILITY
The Symphonie space segment N81-23105
SPACECREWS
Aboard the space shuttle
[NASA-EP-169] N81-23179
SPACELAB
Role of military scientists and engineers in space (1980-2000)
[LA-UR-81-192] N81-23173
SPACETENNAS
Satellite Power Systems (SPS) concept definition study, exhibit F
[NASA-CR-161750] N81-23599
SPALLATION
Instrument development for materials science research at WNR
[LA-UR-80-2969] N81-23442
SPATIAL DISTRIBUTION
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871
SPATIAL FILTERING
Interference cancellation in self-cohering arrays N81-23337
Modeling misregistration and related effects on multispectral classification
[NASA-CR-164282] N81-23563
SPATIAL RESOLUTION
Basic research planning in mathematical pattern recognition and image analysis
[NASA-CR-160946] N81-23561
SPECIFICATIONS
Fuel/engine/airframe trade off study
[AD-A097391] N81-23073
Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664
Evaluating a data abstraction testing system based on formal specifications
[AD-A097231] N81-23809
Software requirements: A report on the state of the art
[AD-A097278] N81-23821
SPECTRAL BANDS
Discovery of natural gain amplification in the 10 muon m CO2 laser bands on Mars: The first definite natural laser
[NASA-TM-82048] N81-23448
SPECTRAL REFLECTANCE
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553
SPECTRAL SIGNATURES
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553
Basic research planning in mathematical pattern recognition and image analysis
[NASA-CR-160946] N81-23561
SPECTROMETERS
The development of two novel spectroelectrochemical techniques N81-23203
SPECTROSCOPY
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871
SPECTRUM ANALYSIS
Minimum-cross-entropy spectral analysis of multiple signals
[AD-A097531] N81-23384
Studies of compressible shear flows and turbulent drag reduction
[NASA-CR-165690] N81-23414
Large-scale waves in the ionosphere observed by the AE satellite N81-23534
Note on computer graphics for maximum entropy spectral analysis
[AD-A097121] N81-23822
SPHERES
The Fisher-Bingham distribution on the sphere
[AD-A097475] N81-23846
Distributions on the circle and sphere
[AD-A097462] N81-23847
SPHERICAL SHELLS
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227
SPORADIC E LAYER
Midlatitude sporadic-E layers N81-23530
SPRAYED COATINGS
Low cost sprayed CdTe solar cell research
[SERI/PR-8104-3-T1] N81-23659
SPREAD F
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531
SPREAD SPECTRUM TRANSMISSION
Experimentation with a Spread Spectrum Multiple Access communication system via the Symphonie satellite N81-23115
Suppression of narrowband interference in pseudo-noise spread spectrum systems
[AD-A097336] N81-23368
SPRINGS (WATER)
Water resources data for Alaska, water year 1979
[PB81-144818] N81-23580
SPUTTERING
Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661
CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683
CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684
STABILIZATION
Evaluation of hot acid treatment for municipal sludge conditioning
[PB81-144446] N81-23982
STACKS
Evaluation of distributed gas cooling of pressurized PAFC for utility power generation
[NASA-CR-165303] N81-23600
Molten carbonate fuel cell system verification and scale-up
[EPRI-EM-1481] N81-23651
STAGNATION FLOW
Investigation of the interaction of lift jets and a ground plane --- wall jet radial momentum flux from rectangular nozzles
[NASA-CR-152343] N81-23026
STAGNATION PRESSURE
Description of recent changes in the Langley 6- by 28-inch transonic tunnel
[NASA-TM-81947] N81-23096
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters
[ISSN-0077-5606] N81-23412
STAINLESS STEELS
Manufacturing process feasibility study
[UCRL-15319] N81-23251
Weld overlaying for corrosion resistance in coal-gasification atmospheres
[FE-2621-15] N81-23254
Physical and mechanical properties of cast 17-4 PH stainless steel
[SAND-80-2302] N81-23260
Localized corrosion and stress-corrosion cracking behavior of stainless steel weldments
[DOE/ER-02462/T1] N81-23261
Glass ceramics for sealing to high-thermal-expansion metals
[SAND-80-2192] N81-23297
X-ray diffraction study of residual stress in model weldments
[UCRL-15332] N81-23504
Alloy development for irradiation performance in fusion reactors
[DOE/ER-10107/1] N81-23914
STANDARDIZATION
NASA Metrology and Calibration, 1980
[NASA-CP-2174] N81-23432
STANDARDS
A basis for traceable NDE measurements
[PB81-145757] N81-23478
Solar energy systems: Standards for cover plates for flat plate solar collectors
[PB81-147290] N81-23709
STATIC LOADS
Assessment of existing studies of wind loading on solar collectors
[SERI/TR-632-812] N81-23501
Wind loading on tracking and field-mounted solar collectors
[SERI/TP-632-958] N81-23502
STATIC TESTS
High-temperature corrosion resistance of alumina refractories to lignite ash slags
[PB81-148272] N81-23299
STATIONKEEPING
Stationkeeping experience with OTS N81-23143
On-orbit control of the Communications Technology Satellite (CTS)/HERMES N81-23145
Symphonie orbit: Determination and orbit; manoeuvre activities N81-23147
STATISTICAL ANALYSIS
Engine parameter trend analysis with LEADS 200: Possibilities and limitations --- using flight recorder data N81-23010
Signal processing in an uncertain environment: Multivariate techniqus of nonparametric and robust detection N81-23336
Atmospheric optical communication systems
[AD-A097673] N81-23366
The interaction of statistics and geology - finite deformations
[AD-A097463] N81-23746
Low-level convergence and the prediction of convective precipitation in south Florida
[AD-A097553] N81-23777
Use of the TI 59 with applications to probability and statistical analysis
[AD-A097384] N81-23807
Modeling of thin-film GaAs growth
[NASA-CR-164317] N81-23926
STATISTICAL DECISION THEORY
Use of second order stochastic dominance in decision aiding
[AD-A097117] N81-23849
STATISTICAL DISTRIBUTIONS
The estimation of palaeomagnetic pole positions
[AD-A097488] N81-23745
Three aspects of the statistics of directions
[AD-A097489] N81-23845
The Fisher-Bingham distribution on the sphere
[AD-A097475] N81-23846
Distributions on the circle and sphere
[AD-A097462] N81-23847
Antipodally symmetric distributions for orientation statistics
[AD-A097460] N81-23848
On the degree of inflation of measures of fit induced by empirical model building
[AD-A097536] N81-23856
STATISTICAL TESTS
A new proof of admissibility of tests in the multivariate analysis of variance
[AD-A097110] N81-23840
A goodness-of-fit test based on spacings
[AD-A097613] N81-23851

Rank-order tests for the parallelism of several regression surfaces
[AD-A097166] N81-23857

A comparison of the ANCILLES and LOGIST parameter estimation procedures for the three-parameter logistic model using goodness of fit as a criterion
[AD-A097081] N81-23858

STEADY FLOW
Some remarks on boundary layer effects on unsteady airloads N81-23050

STEAM TURBINES
STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469

STEELS
Sulfide inclusions in electroslag remelted steels
[AD-A097469] N81-23250

Localized corrosion in materials for geothermal power --- using brines with and without saturated hydrogen sulfide
[DOE/ET-28317/T1] N81-23256

Hydrogen attack of pressure-vessel steel
[DOE/ER-02872/5] N81-23258

Atmospheric corrosion resistance of steels prepared from the magnetic fraction of urban refuse
[PB81-148215] N81-23265

Slime Analysis of painted steel panels immersed in Biscayne Bay, Miami Beach, Florida
[AD-A097229] N81-23280

STELLAR ROTATION
Documentation for the machine-readable version of the University of Michigan Catalogue of two-dimensional spectral types for the HD stars. Volume 2: Declinations minus 53 deg to minus 40 deg
[NASA-TM-82285] N81-23985

STELLAR SPECTRA
Documentation for the machine-readable version of an atlas of ultraviolet stellar spectra and a second atlas of ultraviolet stellar spectra from OAO 2 observations
[NASA-TM-82284] N81-23984

Documentation for the machine-readable version of the University of Michigan Catalogue of two-dimensional spectral types for the HD stars. Volume 2: Declinations minus 53 deg to minus 40 deg
[NASA-TM-82285] N81-23985

STELLARATORS
Limiting beta of stellarators with no net current
[PPPL-1738] N81-23913

STEPPING MOTORS
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142

STIMULATED EMISSION DEVICES
The use of microwaves to characterize optically stimulated semiconductors N81-23374

STIMULATION
Review of the geothermal reservoir well stimulation program
[LA-UR-81-26] N81-23701

STIRLING CYCLE
Potential impacts of Brayton and Stirling cycle engines
[NASA-CR-164278] N81-23603

STOCHASTIC PROCESSES
Relationships of dispersive mass transport and stochastic convective flow through hydrologic systems
[PNL-3302] N81-23428

Distances of random variables and point processes
[AD-A097621] N81-23827

Partial characterizations of completely nondeterministic stochastic processes
[AD-A097514] N81-23844

Use of second order stochastic dominance in decision aiding
[AD-A097117] N81-23849

STOICHIOMETRY
Semiconductor processing by electron beam pulse-induced surface reactions
[PB81-148579] N81-23401

Experimental evaluation of catalytic combustion with heat removal at near stoichiometric conditions
[NASA-TM-81748] N81-23609

STORAGE RINGS (PARTICLE ACCELERATORS)
High power ICRH experiments on the Wisconsin levitated octupole
[DOE/ET-53051/15] N81-23903

STORAGE STABILITY
Fundamental synthetic fuel stability study
[DOE/BC-10045/12] N81-23316

STRAIN HARDENING
The elasto-plastic behavior of inclusions N81-23238

Constitutive models for compressive loading of geologic materials
[UCRL-53073] N81-23757

STRAIN RATE
Response of a plain and filled elastomer (Solithane 113) to high strain-rate compression, shear, and tension loading
[AD-A097455] N81-23278

STRATIFIED FLOW
An efficient code for the simulation of nonhydrostatic stratified flow over obstacles
[NASA-CR-3385] N81-23762

STRATOSPHERE
Energetics of a sudden stratospheric warming simulated with a three-dimensional, spectral, quasi-geostrophic model
[NASA-TP-1847] N81-23761

STREAMLINED BODIES
An investigation of drag reduction for a standard truck with various modifications
[NASA-CR-163107] N81-23040

STREAMS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542

Water resources data for Arkansas, water year 1979
[PB81-144842] N81-23579

Water resources data for Alaska, water year 1979
[PB81-144818] N81-23580

STRESS ANALYSIS
Diffusion mechanisms and degradation of environmentally sensitive composite materials
[COO-444-9] N81-23196

MEGA16 - Computer program for analysis and extrapolation of stress-rupture data
[NASA-TP-1809] N81-23486

Extension of oblique incidence method to photo-orthotropic-elasticity
[NASA-CR-164334] N81-23492

Strain-dependent creep damage in random inhomogeneous materials
[AD-A097164] N81-23497

Structure response and damage produced by airblast form surface mining
[PB81-148918] N81-23593

STRESS CORROSION CRACKING
Cost-effectiveness of countermeasures to intergranular stress corrosion cracking in BWR piping
[EPRI-NP-1703] N81-23252

Localized corrosion and stress-corrosion cracking behavior of stainless steel weldments
[DOE/ER-02462/T1] N81-23261

STRESS CYCLES
High temperature low cycle fatigue data for three high strength nickel-base superalloys
[AD-A097430] N81-23246

STRESS INTENSITY FACTORS
Flaw growth of 6Al-4V STA titanium in nitrogen tetroxide with low nitric oxide content
[NASA-CR-160945] N81-23242

STRESS MEASUREMENT
Shaft design in the Coeur d'Alene Mining District, Idaho: Results of in situ stress and physical property measurements
[PB81-148199] N81-23591

STRESS TENSORS
Fundamental research in turbulent modeling. Part 1: Theory. Part 2: Experiment
[AD-A097431] N81-23425

STRESS-STRAIN RELATIONSHIPS
A single-expression formula for inverting strain-life and stress-strain relationships
[NASA-CR-165347] N81-23491

The interaction of statistics and geology - finite deformations
[AD-A097463] N81-23746

STRESSED-SKIN STRUCTURES
Stressed skin action in composite panels comprising steel sheeting and boards
[PB81-135733] N81-23331

STRESSES
Impacted notch bend specimen --- aluminum alloys
[AD-A097131] N81-23495

STRIP MINING
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550

Structure response and damage produced by airblast form surface mining
[PB81-148918] N81-23593

STRONTIUM FLUORIDES
The strontium heat source development program
[PNL-1845-48] N81-23503

STRUCTURAL ANALYSIS
The finite element method for sheet metal structures - development of a computer program
[PB81-135725] N81-23330

Assessment of existing studies of wind loading on solar collectors
[SERI/TR-632-812] N81-23501

STRUCTURAL BASINS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542

Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

STRUCTURAL DESIGN
Coupled walls in earthquake-resistant buildings, modeling techniques and dynamic analysis
[PB81-132698] N81-23329

Design optimization in underground coal systems. Volume 3: Structural characterization of coal
[FE-1231-21-VOL-3] N81-23575

MOD-OA 200 kW wind turbine generator engineeringing
[NASA-CR-165129] N81-23598

Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621

Advanced solar concentrator: Preliminary and detailed design
[NASA-CR-164316] N81-23623

STRUCTURAL DESIGN CRITERIA
Aircraft wing weight build-up methodology with modification for materials and construction techniques
[NASA-CR-166173] N81-23068

Shaft design in the Coeur d'Alene Mining District, Idaho: Results of in situ stress and physical property measurements
[PB81-148199] N81-23591

Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664

STRUCTURAL VIBRATION
Vibration of curved beams N81-23484

Structure response and damage produced by airblast form surface mining
[PB81-148918] N81-23593

STRUCTURAL WEIGHT
Aircraft wing weight build-up methodology with modification for materials and construction techniques
[NASA-CR-166173] N81-23068

SUBMILLIMETER WAVES
Quasi-optical techniques for millimeter and submillimeter-wave circuits
[AD-A097355] N81-23388

SUBSIDENCE
Design optimization in underground coal systems. Volume 7: Prediction of mining subsidence and related parameters over longwall mining operations
[FE-1231-25] N81-23576

SUBSONIC FLOW
Some remarks on the unsteady airloads on oscillating control surfaces in subsonic flow N81-23055

Technical evaluation report on the Fluid Dynamic Panel Symposium on Subsonic/Transonic Configuration/Aerodynamics
[AGARD-AR-146] N81-23431

SUBSONIC FLUTTER
Experimental flutter at high subsonic speeds and its theoretical prediction, taking into account wing thickness and Reynolds number N81-23052

SUBSONIC WIND TUNNELS
Characteristics, performances and testing capabilities of four main European subsonic wind-tunnels (RAE-5 m, ONERA FL and SIMA, DNW)
[AC/243(CC)D/12] N81-23094

SUBSTRATES
The establishment of a production-ready manufacturing process utilizing thin silicon substrates for solar cells
[NASA-CR-164327] N81-23615

SUDDEN IONOSPHERIC DISTURBANCES
Solar-geophysical data number 433. Part 1: (Prompt Reports) Data for August 1980, July 1980, March 1980 and late data
[PB81-145278] N81-23995

SUGAR BEETS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

SUGAR CANE
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Recycling of sewage effluent by sugarcane irrigation: A dilution study, October 1976 to October 1978, Phase 2-A
[PB81-144669] N81-23983

SULFATION
Gaseous sulfidation of pure molybdenum at 700 deg - 950 deg C N81-23239

SULFIDES
Sulfide inclusions in electroslag remelted steels
[AD-A097469] N81-23250
Experimental investigations of certain side reactions and the initial voltage transient for FeS2 cathodes in thermal batteries
[SAND-80-2341] N81-23399

SULFUR COMPOUNDS
Preconcentration methods for the determination of gaseous sulfur compounds in air N81-23710

SULFURIC ACID
Electrolytic reduction of chromium (6) and copper using coke electrodes
[PB81-148249] N81-23263
Electrochemical corrosion of iron-chromium alloys under ultra-high-purity conditions --- sulfuric acid solutions
[PB81-147134] N81-23271

SUNFLOWERS
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

SUNSPOTS
Prediction techniques for forthcoming solar maxima N81-23536

SUPERCONDUCTIVITY
Theory of flux-flow voltage noise in type II superconductors
[IS-T-935] N81-23398

SUPERCONDUCTORS
Theory of flux-flow voltage noise in type II superconductors
[IS-T-935] N81-23398

SUPERCRITICAL WINGS
Oscillating supercritical airfoils in the transonic regime with viscous interactions N81-23047
Experimental studies of scale effects on oscillating airfoils at transonic speeds N81-23054

SUPERHIGH FREQUENCIES
S-band microwave system, revision
[AD-A097641] N81-23348
Station stability measurement N81-24004
ISPM X-band uplink technology demonstration. Part 1: Overview N81-24006

SUPERPLASTICITY
Microstructural changes following superplastic deformation of commercially pure titanium
[AD-A097277] N81-23247

SUPERSATURATION
Model systems for the epitaxial growth and capping of GaAs
[AD-A097410] N81-23928

SUPERSONIC COMBUSTION
Multiple-scale turbulence modeling of boundary layer flows for scramjet applications
[NASA-CR-3433] N81-23411

SUPERSONIC COMMERCIAL AIR TRANSPORT
Transonic flutter study of a wind-tunnel model of an arrow-wing supersonic transport --- SCAT-15F model test in the Langley Transonic Dynamics Tunnel
[NASA-TM-81962] N81-23071

SUPERSONIC FLOW
Calculation of two-dimensional inlet flow fields by an implicit method including viscous effects: User's manual
[NASA-CR-3412] N81-23027
Multinozzle plume flowfields
[AD-A097244] N81-23419

SUPERSONIC NOZZLES
An analytical procedure and automated computer code used to design model nozzles which meet MSFC base pressure similarity parameter criteria --- space shuttle
[NASA-CR-161757] N81-23187

SUPPLYING
Regional comparisons of on-site solar potential in the residential and industrial sectors
[LBL-11789] N81-23695

SUPPORT SYSTEMS
F-16 integrated logistics support: Still time to consider economical alternatives
[PB81-137473] N81-23079

SURFACE ACOUSTIC WAVE DEVICES
Termination of surface acoustic wave velocity and impedance differences between metal strips and free surface regions of metallic gratings
[AD-A097337] N81-23386
The 403 MHz SAW oscillator
[AD-A097675] N81-23387

SURFACE DEFECTS
Low-energy electron diffraction study of the surface-defect structure Ge grown epitaxially on GaAs(110)
[AD-A097599] N81-23927

SURFACE FINISHING
Electrolytic reduction of chromium (6) and copper using coke electrodes
[PB81-148249] N81-23263

SURFACE GEOMETRY
An algorithm for the rapid location of an extreme of a function subject only to geometric restrictions
[NASA-CR-160940] N81-23812

SURFACE PROPERTIES
Chemical diffusion on solid surfaces
[COO-4220-4] N81-23224
Application of ion implantation for the improvement of localized corrosion resistance of M50 steel bearings
[AD-A097230] N81-23466
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489

SURFACE REACTIONS
Surface science and heterogeneous catalysts
[LBL-11690] N81-23230
Semiconductor processing by electron beam pulse-induced surface reactions
[PB81-148579] N81-23401

SURFACE ROUGHNESS
National runway friction measurement program
[AD-A097334] N81-23097
Fluid forces on smooth and rough circular cylinders N81-23402
Machining with a round-nosed form tool N81-23457
Coarsely random cracking in one-crack fatigue models
[AD-A097194] N81-23498

SURFACE TEMPERATURE
Thermal resistance measurements of a built-up roof system
[PB81-140063] N81-23332
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544
Heat Capacity Mapping Mission (HCMM) thermal surface water mapping and its correlation to LANDSAT --- Lake Anna, Virginia
[E81-10137] N81-23546
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759
Physical environment of the Eastern Bering Sea, March 1979
[PB81-148496] N81-23786

SURFACE WATER
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Heat Capacity Mapping Mission (HCMM) thermal surface water mapping and its correlation to LANDSAT --- Lake Anna, Virginia
[E81-10137] N81-23546

SURGES
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785

SURVEILLANCE RADAR
Environment-adaptive radar techniques
[AD-A097262] N81-23351

SURVEYS
General Aviation Activity and Avionics Survey
[AD-A097604] N81-23081
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
Active solar heating and cooling information user study
[SERI/TR-751-747] N81-23691
Physical oceanographic data from the OTEC Punta Tuna, Puerto Rico site, September 1979 - June 1980
[LBL-12327] N81-23784

SWELLING
Effects of internal gas pressure and microstructure on the mechanisms of hot pressing and swelling in ceramics
[COO-2713-5] N81-23293

SWEPTBACK WINGS
Investigation of aerodynamic characteristics of wings having vortex flow using different numerical codes
[NASA-CR-165706] N81-23034

SWITCHING
A study of integrated switching techniques --- voice/data multiplexers
[AD-A097243] N81-23806
Novel passive and active optical devices in waveguide structures N81-23887

SWITCHING CIRCUITS
A study of integrated switching techniques --- voice/data multiplexers
[AD-A097243] N81-23806

SYMPHONIE SATELLITES
Symphonie Symposium, 1980 N81-23101
The Symphonie program: Objectives, operations and technical operations of the project N81-23103
Experimental utilization of the Symphonie system during the first 5 years of operation N81-23104
The Symphonie space segment N81-23105
Performance of the main subsystems of the Symphonie satellites N81-23106
The Symphonie ground stations N81-23107
Utilization analysis of the experimental satellite system Symphonie N81-23108
Experiments selected for the telecommunications test program of the German Post Office --- using symphonie N81-23109
Verification of payload specifications for Symphonie satellites N81-23110
Satellite telecommunications experiments project: An overview N81-23111
The Symphonie experiment in China N81-23112
Transmission of TDMA signals at 60 Mbit/s in the Symphonie system N81-23113

Results of the 60 Mbit/s TDMA system. Tests via Symphonie N81-23114
Experimentation with a Spread Spectrum Multiple Access communication system via the Symphonie satellite N81-23115
Digital communication multiple access scheme --- using Symphonie N81-23116
The Celtic system: An experiment with Symphonie N81-23117
Single Channel Per Carrier (SCPC) scheme for remote area telephony --- equipment testing, using Symphonie N81-23118
Single Channel Per Carrier (SCPC) scheme: Delta modulation. Experimental Results --- Symphonie satellites N81-23119
Integration of satellite circuits in the terrestrial telecommunication network --- Symphonie satellite N81-23121
Design and implementation of a small terminal for the Everest 78 expedition --- Symphonie Himalsat experiment N81-23122
Carrier frequency stability and its effect on phase shift keying signals in the satellite channel --- Symphonie satellite N81-23123
Experiments with a long time delay phase-locked loop via the satellite Symphonie N81-23124
Analog television and radio transmission experiments --- Symphonie satellites N81-23126
Experimental operation of a digital video transmission system --- Symphonie N81-23127
Digital television transmission experiment via Symphonie N81-23128
Tests and results of integrated TV sound transmission --- Symphonie satellites N81-23129
Television with multiple audio facility using time division multiplexing --- Symphonie satellites N81-23130
Computer networking experiment via the Symphonie satellite N81-23131
Signal fluctuations observed during the Symphonie experiment N81-23133
Two-way time transfers between National Research Council (Ottawa) and Paris Observatory via the Symphonie satellite N81-23134
Clock synchronization experiment via Symphonie satellite N81-23135
A time comparison experiment between Shangai and Paris via Symphonie satellite N81-23136
Acceptance and operation of small receiving stations in urban areas N81-23137
Transportable ground stations --- for Symphonie N81-23140
Step tracking system --- for Symphonie N81-23141
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142
Organization and operational configuration of the Symphonie ground control system N81-23146
Symphonie orbit: Determination and orbit; manoeuvre activities N81-23147
Methods and techniques used for Symphonie attitude determination and control N81-23148
Symphonie: In-flight performance of telemetry-telecommand, power supply, thermal control and transponder subsystems N81-23149
Summary of operating experience with the Symphonie satellites N81-23150
Satellite transmission serving radio and television --- Symphonie experiments N81-23152
Satellites and communications: Transmissions between France and Quebec via Symphonie N81-23153
Studies and experiments by Eurospace in the field of education and public service --- Symphonie and third world countries N81-23154
Outcome of Symphonie experiments in Ivory Coast N81-23155
Symphonie program planned for Ivory Coast 1979 - 1980 N81-23156
The experimental use of the Symphonie satellite during the 19th session of the General Conference - UNESCO --- teleconferences N81-23157
Symphonie experiments and future applications of telecommunications satellites for the United Nations network N81-23158
Disaster relief communications via the Symphonie satellite N81-23159
Telecommunications services for special events --- Symphonie applications N81-23160
Public service. Panel discussion D --- Telecommunications and Symphonie satellites N81-23161
The travelling wave tube TL 4003 and further development of TWT --- Symphonie satellites N81-23162
Application of Symphonie experiences in follow-up projects at MBB N81-23163
Transmission parameters of FDM/FM/FDMA telephone and FM television for domestic satellite system in China based on the experiment results via Symphonie N81-23164
The attitude sensors on Symphonie and their subsequent development N81-23165
Thermal control of Symphonie N81-23166
Symphonie experience and selection of broadcasting standards for direct broadcasting satellite systems N81-23171

SYNCHRONISM
Clock synchronization experiment via Symphonie satellite N81-23135
Phase synchronizing, a nonrigid, distribution transmit-receive radar antenna array [AD-A097486] N81-23359
A difference in efficiency between synchronous and asynchronous systems [AD-A097476] N81-23381

SYNCHRONOUS SATELLITES
In-orbit control of geostationary satellites. Panel discussion C N81-23151

SYNCHROTRON RADIATION
Synchrotron emissivity from mildly relativistic particles [NASA-CR-164335] N81-23868

SYNOPTIC METEOROLOGY
Weather scenarios for central Germany [AD-A097527] N81-23771
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta [AD-A097429] N81-23774

SYNTHESIS (CHEMISTRY)
Synthesis and properties of highly conducting derivatives of polyacetylene, polyparaphenyleneand graphite N81-23274
In-place polymerizations of electrophilic olefins [AD-A097453] N81-23277
An investigation of unique metal complexes produced using polystyrene 2,2 prime-bipyridine as a support, and several hydrogenation catalysts derived from this copolymer [AD-A097174] N81-23285
New type of metallo-organic polymer: Bimetalloporphyrins. Investigating a new chemistry of metallophthalocyanines [AD-A097447] N81-23286
Synthesis of hydroxy-terminated dinitropropyl acrylate polymers [AD-A097577] N81-23291
Effect of vinyl and phenyl contents of silicone gum on the properties of the elastomers and cellular silicone cushions [UCRL-53105] N81-23298

SYNTHETIC APERTURE RADAR
New techniques in digital signal processing for synthetic aperture radar [AD-A097279] N81-23365
An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery [NASA-CR-164279] N81-23562

SYNTHETIC APERTURES
Effects of surface-mapping corrections and synthetic-aperture focusing techniques on ultrasonic imaging [EGG-FM-5314] N81-23865

SYNTHETIC FIBERS
Hollow-fiber membranes for photosensitized electron transport [LBL-12359] N81-23220

SYNTHETIC FUELS
Refining and upgrading of synfuels from coal and oilshales by advanced catalytic processes [FE-2315-58] N81-23311
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels (riser cracking of coal) [DOE/ET-10520/1] N81-23314
Fundamental synthetic fuel stability study [DOE/BC-10045/12] N81-23316
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels [DOE/PC-30075/4] N81-23317

SYSTEM EFFECTIVENESS
Symphonie: In-flight performance of telemetry-telecommand, power supply, thermal control and transponder subsystems N81-23149

SYSTEM FAILURES
Detection and location of faults in onboard aircraft systems with the aid of the Automatic Fault Identification System (AFIS) N81-23022

SYSTEMS ANALYSIS
Continuous model of an unreliable two-stage material flow system with a finite interstage buffer [PB81-146862] N81-23859
GPSAP/V2 with applications to open-cycle MHD systems [ANL/MHD-80-15] N81-23908

SYSTEMS ENGINEERING
Design, development, and evaluation of lightweight hydraulic system, phase 1 --- A-7 aircraft [AD-A097505] N81-23075
Single Channel Per Carrier (SCPC) scheme for remote area telephony --- equipment testing, using Symphonie N81-23118
Single Channel Per Carrier (SCPC)-FM system N81-23120
Design and implementation of a small terminal for the Everest 78 expedition --- Symphonie Himalsat experiment N81-23122
Step tracking system --- for Symphonie N81-23141
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142
Thermal control of Symphonie N81-23166
The French German broadcasting satellite program N81-23170
Solar heating and cooling system installed at RKL Controls Company, Lumberton, New Jersey [NASA-CR-161679] N81-23597
Advanced system demonstration for utilization of biomass as an energy source. Volume 4: Design drawings [DOE/ET-20055/T2-VOL-4] N81-23667
Policy options for the transportation-air-quality process [PB81-150914] N81-23737
A feasibility study for a versatile deep sea, multileg, stable, cable array [AD-A097672] N81-23782
Feasibility study of a microprocessor based oculometer system [NASA-CR-164286] N81-23889

SYSTEMS INTEGRATION
Demonstration Advanced Avionics System (DAAS) functional description --- Cessna 402B aircraft [NASA-CR-152405] N81-23080
Integration of satellite circuits in the terrestrial telecommunication network --- Symphonie satellite N81-23121
Symphonie experiments and future applications of telecommunications satellites for the United Nations network N81-23158
The 15kW General Purpose Power Conditioner (frequency changer), inverter/ converter integration [AD-A097165] N81-23380

SYSTEMS MANAGEMENT
Information services: Their organization, control and use --- conferences [AGARD-CP-294] N81-23955

SYSTEMS SIMULATION
MLS: Airplane system modeling [NASA-CR-165700] N81-23059
A nonlinear propulsion system simulation tehnique for piloted simulators [NASA-TM-82600] N81-23085
Design optimization in underground coal systems. Volume 9: Modified FACESIM and COST-SCHED programs [FE-1231-27-VOL-9] N81-23574

T

TABLES (DATA)
Research study: STS-1 Orbiter Descent [NASA-CR-161754] N81-23763

TABS (CONTROL SURFACES)
Introductory remarks on boundary layer effects on unsteady airloads N81-23045
TANKS (CONTAINERS)
A nonlinear analysis of liquid sloshing in rigid containers
[PB81-135204] N81-23430
TARGET ACQUISITION
Advanced target tracker concepts
[AD-A097358] N81-23890
TARGET RECOGNITION
Reconnaissance Sensor System exploitation
[AD-A097224] N81-23567
Sensor image prediction techniques
[AD-A097638] N81-23895
TASK COMPLEXITY
Effects of criteria on flight simulation. Study 2: Multiple criteria
[AD-A097526] N81-23794
TECHNOLOGY ASSESSMENT
Rotorcraft aviation icing research requirements: Research review and recommendations
[NASA-CR-165344] N81-23070
DOD's use of remotely piloted vehicle technology offers opportunities for saving lives and dollars
[AD-A097419] N81-23074
An evaluation of NASA's program for advancing rotorcraft technology
[PB81-144180] N81-23078
Communication satellites in Canada N81-23169
STS-1 Mission Assessment
[NASA-TM-82348] N81-23180
Ethanol production in northern New York: Technical and economic feasibility
[PB81-144438] N81-23322
Processing equipment for resource recovery systems. Volume 2: Magnetic separators, air classifier and ambient air emissions tests
[PB81-141590] N81-23324
Assessment of disk MHD generators for a base load powerplant
[NASA-TM-82609] N81-23611
Large wind turbine generator performance assessment
[EPRI-AP-1641] N81-23645
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692
Assessment of the solar heating and cooling in residential building demonstration program
[DOE/PE-70278/T10] N81-23698
Solar enhanced oil recovery: A potential early market for industrial solar energy
[SAND-80-1869C] N81-23702
Diesel-exhaust emissions-toxicology program
[LMF-81] N81-23719
A preliminary study of head-up display assessment techniques. 2: HUD symbology and panel information search time
[NASA-TM-78536] N81-23799
Wavelength division multiplexing: Overview of the state of the art
[AD-A097587] N81-23896
TECHNOLOGY TRANSFER
Impact of operational experience on research and development --- nuclear power plants
[EPRI-NP-1689-SR] N81-23397
Assessment of nickel-hydrogen batteries for terrestrial solar applications
[SAND-80-7191] N81-23706
Information transfer: Barriers and trends N81-23956
Portuguese scientific and technical information scene: Present status and future prospects N81-23957
Euronet and its interlinking to other networks N81-23958
TECHNOLOGY UTILIZATION
An evaluation of NASA's program for advancing rotorcraft technology
[PB81-144180] N81-23078
Symphonie Symposium, 1980 N81-23101
The role of telecommunication satellites in developing countries N81-23102
TELECOMMUNICATION
Symphonie Symposium, 1980 N81-23101
The Symphonie program: Objectives, operations and technical operations of the project N81-23103
Experimental utilization of the Symphonie system during the first 5 years of operation N81-23104
The Symphonie space segment N81-23105
Performance of the main subsystems of the Symphonie satellites N81-23106
The Symphonie ground stations N81-23107
Utilization analysis of the experimental satellite system Symphonie N81-23108
Experiments selected for the telecommunications test program of the German Post Office --- using symphonie N81-23109
Satellite telecommunications experiments project: An overview N81-23111
Transportable ground stations --- for Symphonie N81-23140
Studies and experiments by Eurospace in the field of education and public service --- Symphonie and third world countries N81-23154
Public service. Panel discussion D --- Telecommunications and Symphonie satellites N81-23161
Requirements for domestic and regional telecommunications satellites: Panel discussion E N81-23172
Market capture by 30/20 GHz satellite systems. Volume 1: Executive summary
[NASA-CR-165231] N81-23345
Market capture by 30/20 GHz satellite systems, volume 2
[NASA-CR-165232] N81-23346
The 30/20 GHz communications system functional reqirements
[NASA-CR-165301] N81-23347
Challenges and opportunities in Air Forces tactical communications
[AD-A097677] N81-23352
Access protocol for a parallel wideband local digital communication network - proposed standard
[AD-A097354] N81-23357
Degradation of the performance of communication systems in the presence of interference
[AD-A097685] N81-23369
Telecommunications and data acquisition
[NASA-CR-164288] N81-23997
ISPM X-band uplink technology demonstration. Part 1: Overview N81-24006
Radio frequency interference protection of communications between the Deep Space Network and deep space flight projects N81-24015
DSN scheduling system N81-24016
TELECONFERENCING
Satellites and communications: Transmissions between France and Quebec via Symphonie N81-23153
Symphonie program planned for Ivory Coast 1979 - 1980 N81-23156
The experimental use of the Symphonie satellite during the 19th session of the General Conference - UNESCO --- teleconferences N81-23157
TELEMETRY
High speed front end of the multimegabit telemetry demodulator detector N81-24005
Optimum design of hybrid phase locked loops N81-24010
TELEPHONY
The Celtic system: An experiment with Symphonie N81-23117
Single Channel Per Carrier (SCPC) scheme for remote area telephony --- equipment testing, using Symphonie N81-23118
Integration of satellite circuits in the terrestrial telecommunication network --- Symphonie satellite N81-23121
TELEVISION CAMERAS
Flameproof television camera set for the observation of coal seams and rock strata as well as of tectonic surfaces in underground boreholes
[BMFT-FB-T-80-149] N81-23370
TELEVISION EQUIPMENT
Transportable terminals for STEP N81-23138
TELEVISION TRANSMISSION
Analog television and radio transmission experiments --- Symphonie satellites N81-23126
Experimental operation of a digital video transmission system --- Symphonie N81-23127
Digital television transmission experiment via Symphonie N81-23128
Tests and results of integrated TV sound transmission --- Symphonie satellites N81-23129
Television with multiple audio facility using time division multiplexing --- Symphonie satellites N81-23130
Satellite transmission serving radio and television --- Symphonie experiments N81-23152
Satellites and communications: Transmissions between France and Quebec via Symphonie N81-23153
Digital transmission tests of multiplexed video and audio signals at 60 Mbit/s via Orbital Test Satellite (OTS)
[BBC-RD-1980/16] N81-23342
TEMPERATE REGIONS
The effects of auroral activity on the midlatitude ionosphere N81-23517
TEMPERATURE CONTROL
Thermal control of Symphonie N81-23166
Study of a temperature-stabilized heat pipe system with electrical feedback
[IKE-5-196] N81-23649
TEMPERATURE DISTRIBUTION
A climatological guide for Meteosat users
[ESA-SP-1027] N81-23759
TEMPERATURE EFFECTS
Thermal analysis of malleable base white iron for quality control N81-23237
Thermally stimulated currents in glasses N81-23272
Thermally stimulated polarization and depolarization current (TSPC/TSDC) in glass N81-23273
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290
Assessment of variations in thermal cycle life data of thermal barrier coated rods
[NASA-TM-81743] N81-23418
TEMPERATURE GRADIENTS
High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295
TEMPERATURE MEASUREMENT
Investigation of the use of liquid crystal thermography to study flow over turbomachinery blades
[AD-A097289] N81-23089
Thermal resistance measurements of a built-up roof system
[PB81-140063] N81-23332
Heat generation in aircraft tires under free rolling conditions
[NASA-CR-164273] N81-23461
Calculation of atmospheric loss from microwave radiometric noise temperature measurements N81-24008
TEMPERATURE MEASURING INSTRUMENTS
A solid-state digital temperature recorder for space use
[NASA-TM-81267] N81-23434
Digital hand-held temperature monitor
[AD-A097130] N81-23441
TEMPERATURE PROFILES
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557

Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560

TEMPORAL RESOLUTION
On the use of off-nadir pointing for increased temporal resolution of Earth observing satellite systems
[NASA-TM-82139] N81-23175
Basic research planning in mathematical pattern recognition and image analysis
[NASA-CR-160946] N81-23561

TENSILE PROPERTIES
Manufacturing process feasibility study
[UCRL-15319] N81-23251
Response of a plain and filled elastomer (Solithane 113) to high strain-rate compression, shear, and tension loading
[AD-A097455] N81-23278

TENSILE STRENGTH
Physical and mechanical properties of cast 17-4 PH stainless steel
[SAND-80-2302] N81-23260

TENSILE STRESS
Improving the distribution and reducing the magnitude of pavement damage
[PB81-145864] N81-23333

TERRAIN FOLLOWING AIRCRAFT
A study of the effect of terrain on helicopter noise propagation by acoustical modeling
[AD-A097626] N81-23864

TERRESTRIAL RADIATION
Earth limb radiance transformation
[AD-A097523] N81-23753

TEST FACILITIES
Frequency standard test facility data acquisition and processing system N81-24002

TETHERED BALLOONS
Evaluation of a tethered kite anemometer
[AD-A097082] N81-23440

TEXAS
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel
[AD-A097529] N81-23767

THEMATIC MAPPING
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549

THEOREM PROVING
A new proof of admissibility of tests in the multivariate analysis of variance
[AD-A097110] N81-23840

THERMAL BATTERIES
Experimental investigations of certain side reactions and the initial voltage transient for FeS2 cathodes in thermal batteries
[SAND-80-2341] N81-23399

THERMAL DECOMPOSITION
Design, fabrication, and bench testing of a solar chemical receiver
[NASA-CR-164333] N81-23620

THERMAL DEGRADATION
Heat sterilizable solid-propellant development
[NASA-CR-164281] N81-23300

THERMAL ENERGY
Next steps in two-phase flow: Executive summary
[DOE/ET-27225/12] N81-23429
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604
High temperature solar receiver
[NASA-CR-164332] N81-23614
Design, fabrication, and bench testing of a solar chemical receiver
[NASA-CR-164333] N81-23620
Economic assessment of advanced central-receiver solar-thermal power system. Executive summary
[DOE/SF-10601/T1] N81-23680
Economic assessment of advanced central-receiver solar-thermal power systems: PG and E assessment
[DOE/SF-10601/2] N81-23682
The Coolidge Solar Irrigation Project
[SAND-80-2378] N81-23705

THERMAL INSULATION
Calculated operating temperatures of thermally insulated electric cables
[PB81-145781] N81-23400

THERMAL MAPPING
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions --- south Texas
[E81-10130] N81-23543
Heat Capacity Mapping Mission (HCMM) thermal surface water mapping and its correlation to LANDSAT --- Lake Anna, Virginia
[E81-10137] N81-23546
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

THERMAL NOISE
A study of flicker noise in MOSFETS
[AD-A097557] N81-23389

THERMAL POLLUTION
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560

THERMAL RESISTANCE
Thermal resistance measurements of a built-up roof system
[PB81-140063] N81-23332

THERMAL SHOCK
Microstructural effects on the mechanical properties and thermal shock resistance of a high alumina refractory concrete N81-23479

THERMAL STABILITY
Materials for high-temperature hydrogen fluorine environments --- HV laser system nozzles
[Y-2201] N81-23191
Tribological properties and thermal stability of various types of polyimide films
[NASA-TM-81765] N81-23275

THERMAL STRESSES
Assessment of variations in thermal cycle life data of thermal barrier coated rods
[NASA-TM-81743] N81-23418
STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469

THERMOCHEMISTRY
Thermochemistry of gaseous compounds of metals
[AD-A097352] N81-23210

THERMOCLINES
Feasibility of large scale deliberate tracer release experiments in or below the oceanic thermocline
[DOE/EV-10038/1] N81-23783

THERMODYNAMIC CYCLES
Prolonging thermal barrier coated specimen life by thermal cycle management
[NASA-TM-81742] N81-23417
Assessment of variations in thermal cycle life data of thermal barrier coated rods
[NASA-TM-81743] N81-23418
Analyses of mixed-hydrocarbon binary thermodynamic cycles for moderate-temperature geothermal resources
[EGG-PG-G-80-041] N81-23644

THERMODYNAMIC EFFICIENCY
Coal gasification availability analysis
[PB81-153272] N81-23321

THERMODYNAMIC PROPERTIES
High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295
Hot spot initiation patterns in shocked explosives and propellants recorded by thermal film
[AD-A097088] N81-23305

THERMODYNAMICS
Fluidization using non-equilibrium thermodynamics
[PB81-153249] N81-23707

THERMOELECTRIC GENERATORS
Radioisotope space power generator
[GA-A-15683] N81-23638

THERMOHYDRAULICS
Comparison between the SIMPLE and ENERGY mixing models
[DOE/ET-37240/78TR] N81-23703

THERMOPLASTIC RESINS
Static and dynamic evaluation of A-37 cast and cast carcass/integral tread tires
[AD-A097684] N81-23465

THERMOSPHERE
Thermospheric neutral composition changes and their causes N81-23524
On the morphology of the polar thermosphere N81-23528
Large-scale waves in the ionosphere observed by the AE satellite N81-23534

THICK FILMS
Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617

THIN FILMS
Amorphous and microcrystalline thin films of iron-base alloys for corrosion resistant coatings N81-23235
Thin film optical devices and quantum electronics
[AD-A097246] N81-23450
Thin films of InP for photovoltaic energy conversion
[COO-3004-4] N81-23632
High efficiency thin film CdTe solar cells
[SERI/PR-9133-1-T1] N81-23641
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
Low cost sprayed CdTe solar cell research
[SERI/PR-8104-3-T1] N81-23659
Electrochemical photovoltaic cells CdSe thin film electrodes
[SERI/TR-8002-8-T1] N81-23676
CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683
CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684
Modeling of thin-film GaAs growth
[NASA-CR-164317] N81-23926

THIN PLATES
On certain integrals which pertain to the forced vibration of plates
[NASA-CR-166175] N81-23488

THOMSON SCATTERING
MFTF Thomson scattering: A system study
[UCRL-53051] N81-23371
THREE AXIS STABILIZATION
Methods and techniques used for Symphonie attitude determination and control N81-23148
Application of Symphonie experiences in follow-up projects at MBB N81-23163
THREE BODY PROBLEM
Three-body helicity formalism applied to pion-deuteron scattering
[DOE/ER-05223/31] N81-23874
THREE DIMENSIONAL FLOW
Topology of three-dimensional separated flows
[NASA-TM-81294] N81-23037
Multinozzle plume flowfields
[AD-A097244] N81-23419
Turbulent flow and heat transfer in passage around 180 degree bend: An experimental and numerical study
[AD-A097461] N81-23421
THRUST
Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel
[NASA-TM-81285] N81-23039
THUNDERSTORMS
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531
Ionospsheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760
TIMBER INVENTORY
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545
Multistage variable probability forest volume inventory --- the Defiance Unit of the Navajo Nation
[E81-10140] N81-23549
TIME DEPENDENCE
Analysis of turbulent flow about an isolated airfoil using a time dependent Navier-Stokes procedure N81-23053
A difference in efficiency between synchronous and asynchronous systems
[AD-A097476] N81-23381
Shock spectrum calculation from acceleration time histories
[AD-A097162] N81-23755
TIME DIVISION MULTIPLE ACCESS
Transmission of TDMA signals at 60 Mbit/s in the Symphonie system N81-23113
Results of the 60 Mbit/s TDMA system. Tests via Symphonie N81-23114
TIME DIVISION MULTIPLEXING
Television with multiple audio facility using time division multiplexing --- Symphonie satellites N81-23130
A study of avionics time division multiplex bus simulation
[AD-A097375] N81-23810
TIME LAG
Experiments with a long time delay phase-locked loop via the satellite Symphonie N81-23124
TIME MEASUREMENT
Analysis of brief duration losses and error structures in satellite links N81-23125
Clock synchronization experiment via Symphonie satellite N81-23135
A time comparison experiment between Shangai and Paris via Symphonie satellite N81-23136
TIME SERIES ANALYSIS
A Monte Carlo study of AR(1) estimators under several performance criteria
[AD-A097533] N81-23853
TIME SIGNALS
Two-way time transfers between National Research Council (Ottawa) and Paris Observatory via the Symphonie satellite N81-23134
A time comparison experiment between Shangai and Paris via Symphonie satellite N81-23136
TITANIUM
Flaw growth of 6Al-4V STA titanium in nitrogen tetroxide with low nitric oxide content
[NASA-CR-160945] N81-23242
Microstructural changes following superplastic deformation of commercially pure titanium
[AD-A097277] N81-23247
Iron-base alloys strengthened by Laves phases as substitutes for stainless steels
[PB81-150153] N81-23268
Shape-casting titanium in olivine, garnet, chromite, and zircon rammed and shell molds
[PB81-147274] N81-23475
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489
TITANIUM ALLOYS
Environmental effects on fatigue behavior of metals
[AD-A097546] N81-23248
Shape-casting titanium in olivine, garnet, chromite, and zircon rammed and shell molds
[PB81-147274] N81-23475
TITANIUM CARBIDES
Alloy development for irradiation performance in fusion reactors
[DOE/ER-10107/1] N81-23914
TOKAMAK DEVICES
ONETWO: A computer code for modeling plasma transport in Tokamaks
[GA-A-16178] N81-23901
Tensor pressure Tokamak equilibrium and stability
[ORNL/TM-7120] N81-23906
D-D Tokamak reactor studies
[ANL/FPP/TM-138] N81-23907
Wave-driver options for low-aspect-ratio steady-state Tokamak reactors
[ANL/FPP/TM-141] N81-23915
TOMOGRAPHY
Semiconductor detectors for medical tomography with high-energy heavy ions
[LBL-11037] N81-23790
TOPOGRAPHY
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
A general inverse solution for 2D edge waves
[AD-A097683] N81-23748
TOPOLOGY
Topology of three-dimensional separated flows
[NASA-TM-81294] N81-23037
Three aspects of the statistics of directions
[AD-A097489] N81-23845
The Fisher-Bingham distribution on the sphere
[AD-A097475] N81-23846
Distributions on the circle and sphere
[AD-A097462] N81-23847
Formulation of nonlinear network equations using topological potential functions N81-23860
TORNADOES
Ionospsheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760
TOROIDAL PLASMAS
High power ICRH experiments on the Wisconsin levitated octupole
[DOE/ET-53051/15] N81-23903
Wave-driver options for low-aspect-ratio steady-state Tokamak reactors
[ANL/FPP/TM-141] N81-23915
Compact toroids generated by a magnetized coaxial source in the CTX experiment
[LA-UR-81-325] N81-23917
Fusion component design for the moving-ring field-reversed mirror reactor
[UCID-18916] N81-23922
TORQUE
Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel
[NASA-TM-81285] N81-23039
TORSIONAL VIBRATION
Free torsional vibrations of a hollow cylinder with laminated periodic structure
[AD-A097163] N81-23496
TOXIC HAZARDS
Diesel-exhaust emissions-toxicology program
[LMF-81] N81-23719
TOXICITY
Environmental quality research fish and aufwuchs bioassay
[AD-A097080] N81-23714
Fluidized-bed combustion emissions: Toxicology program
[LMF-83] N81-23718
TRACE ELEMENTS
The role of microcomputers in trace metal analysis N81-23198
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste
[BNL-28668] N81-23228
Metallic species derived from fluidized bed coal combustion
[DOE/MC-08196/T1] N81-23257
TRACKING (POSITION)
Detection thresholds for multitarget tracking in clutter
[AD-A097188] N81-23350
A time domain simulation of a beam control system
[AD-A097423] N81-23453
Advanced target tracker concepts
[AD-A097358] N81-23890
TRAILING EDGES
Trailing edge wake flow characteristics of upper surface blown configurations --- noise generators
[NASA-CR-152224] N81-23028
Mean-flow and turbulence measurements in the vicinity of the trailing edge of an NACA (63 sub 1)-012 airfoil
[NASA-TP-1845] N81-23410
TRAILING-EDGE FLAPS
Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051
TRAINING DEVICES
Instructor/operator display evaluation methods
[AD-A097208] N81-23802
TRAINING EVALUATION
Instructor/operator display evaluation methods
[AD-A097208] N81-23802
TRANSFORMATIONS (MATHEMATICS)
Earth limb radiance transformation
[AD-A097523] N81-23753
A decoding failure test for the transform decoder of Reed-Solomon code N81-24014
TRANSIT SATELLITES
Scout/Navy transit improvement program (NOVA-1) launch
[NASA-TM-82350] N81-23177
TRANSMISSION EFFICIENCY
Transmission of TDMA signals at 60 Mbit/s in the Symphonie system N81-23113
Analog television and radio transmission experiments --- Symphonie satellites N81-23126
Experimental operation of a digital video transmission system --- Symphonie N81-23127
Digital transmission tests of multiplexed video and audio signals at 60 Mbit/s via Orbital Test Satellite (OTS)
[BBC-RD-1980/16] N81-23342
Thick phase holograms
[AD-A097201] N81-23436
TRANSMISSION LINES
Termination of surface acoustic wave velocity and impedance differences between metal strips and free surface regions of metallic gratings
[AD-A097337] N81-23386
Calculated operating temperatures of thermally insulated electric cables
[PB81-145781] N81-23400
TRANSMISSION LOSS
Analysis of brief duration losses and error structures in satellite links N81-23125
Calculation of atmospheric loss from microwave radiometric noise temperature measurements N81-24008
The reliability of multistate, multioutput systems N81-24011
TRANSMITTANCE
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, summer, 1978
[AD-A097134] N81-23749
TRANSMITTER RECEIVERS
Single Channel Per Carrier (SCPC) scheme: Delta modulation. Experimental Results --- Symphonie satellites N81-23119
Single Channel Per Carrier (SCPC)-FM system N81-23120

Design and implementation of a small terminal for the Everest 78 expedition --- Symphonie Himalsat experiment N81-23122

TRANSONIC FLOW

Unsteady transonic flow past airfoils in rigid body motion --- predicting aerodynamic forces for flutter analysis
[AD-A097142] N81-23041

An assessment of theoretical models for viscous and transonic flow N81-23046

Oscillating supercritical airfoils in the transonic regime with viscous interactions N81-23047

Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051

Technical evaluation report on the Fluid Dynamic Panel Symposium on Subsonic/Transonic Configuration/Aerodynamics
[AGARD-AR-146] N81-23431

TRANSONIC FLUTTER

Introductory remarks on boundary layer effects on unsteady airloads N81-23045

Transonic flutter study of a wind-tunnel model of an arrow-wing supersonic transport --- SCAT-15F model test in the Langley Transonic Dynamics Tunnel
[NASA-TM-81962] N81-23071

Transonic flutter and gust-response tests and analyses of a wind-tunnel model of a torsion free wing airplane
[NASA-TM-81961] N81-23072

TRANSONIC SPEED

Experimental studies of scale effects on oscillating airfoils at transonic speeds N81-23054

TRANSONIC WIND TUNNELS

Description of recent changes in the Langley 6- by 28-inch transonic tunnel
[NASA-TM-81947] N81-23096

TRANSPONDERS

Summary of transponder data, May 1979 - November 1979
[AD-A097569] N81-23061

The Symphonie experiment in China N81-23112

TRANSPORT PROPERTIES

A theoretical study of turbulence in terms of conditioned variables --- flow visualization N81-23405

Microscopic approach to transport in two-phase random media N81-23408

Laser assisted semiconductor device processing
[AD-A097427] N81-23452

Analytical treatment of gravity effects on gas loaded variable conductance heat pipes
[AD-A097679] N81-23629

TRANSPORT THEORY

ONETWO: A computer code for modeling plasma transport in Tokamaks
[GA-A-16178] N81-23901

TRANSPORTATION

Policy options for the transportation-air-quality process
[PB81-150914] N81-23737

TRAPPING

High-field effects in metal-aluminum oxide-silicon capacitors N81-23378

Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617

TRAVELING IONOSPHERIC DISTURBANCES

The generation and propagation of atmospheric gravity waves with special reference to radio propagation N81-23535

TRAVELING WAVE TUBES

The travelling wave tube TL 4003 and further development of TWT --- Symphonie satellites N81-23162

TRAVELING WAVES

Large and small deformation finite element analysis of rolling contact N81-23482

TREES (PLANTS)

An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545

TRIBOLOGY

Tribological properties and thermal stability of various types of polyimide films
[NASA-TM-81765] N81-23275

TRINITROTOLUENE

TNT equivalency of bulk nitrocellulose
[AD-A097472] N81-23303

TROPICAL STORMS

Tropical cyclone forecast verification as a function of reconnaissance platform
[AD-A097454] N81-23775

TROPOSPHERE

Report of the NASA working group on tropospheric program planning
[NASA-RP-1062] N81-23742

TROPOSPHERIC SCATTERING

Channel measurement decoding for troposcatter communications
[AD-A097620] N81-23367

TRUCKS

An investigation of drag reduction for a standard truck with various modifications
[NASA-CR-163107] N81-23040

Propane conversion in the vehicle fleet at the Idaho National Engineering Laboratory
[EGG-TRANS-5291] N81-23977

TURBINE BLADES

Assessment of gas turbine erosion. Volume 2: Erosion analysis and test planning
[PB81-139677] N81-23091

Assessment of gas turbine erosion. Volume 1: Assessment of available erosion data
[PB81-139685] N81-23092

TURBINE ENGINES

Combustion system processes leading to corrosive deposits
[NASA-TM-81752] N81-23243

TURBINE WHEELS

STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469

TURBINES

High-temperature turbine technology program turbine simulator tests with coal-derived low-Btu gas fuel
[FE-1806-92] N81-23473

TURBOCOMPRESSORS

Measurement and analysis of the periodic variation of total pressure in an axial-flow compressor stage
[AD-A097296] N81-23090

TURBOGENERATORS

Research and development of a 3 MW power plant from the design, development, and demonstration of a 100 KW power system utilizing the direct contact heat exchanger concept for geothermal brine recovery project
[DOE/ET-28456/T1] N81-23656

TURBOJET ENGINES

Investigations into local fault detection on turbojet engines --- monitoring instruments N81-23011

TURBOMACHINERY

Classification of operating conditions of turbomachines from solid borne sound N81-23015

TURBULENCE

Prediction of the turbulent wake with second-order closure
[NASA-CR-164294] N81-23038

Kinetic theory and turbulent discontinuities --- shock tube flow
[NASA-CR-164287] N81-23413

TURBULENT BOUNDARY LAYER

Preliminary results of a study of unsteady airfoil surface pressures and turbulent boundary layers
[AD-A097560] N81-23042

Methods for calculating unsteady turbulent boundary layers N81-23048

Experiments on a turbulent unsteady boundary layer with separation N81-23057

Mean-flow and turbulence measurements in the vicinity of the trailing edge of an NACA (63 sub 1)-012 airfoil
[NASA-TP-1845] N81-23410

Compressible turbulent boundary layer interaction experiments
[NASA-CR-164292] N81-23415

TURBULENT FLOW

Analysis of turbulent flow about an isolated airfoil using a time dependent Navier-Stokes procedure N81-23053

A theoretical study of turbulence in terms of conditioned variables --- flow visualization N81-23405

Experimental and theoretical investigation of droplet deposition and heat transfer in air-water dispersed flow N81-23409

Multiple-scale turbulence modeling of boundary layer flows for scramjet applications
[NASA-CR-3433] N81-23411

Studies of compressible shear flows and turbulent drag reduction
[NASA-CR-165690] N81-23414

An experimental and numerical comparison of turbulent flow over a step
[AD-A097141] N81-23420

Turbulent flow and heat transfer in passage around 180 degree bend: An experimental and numerical study
[AD-A097461] N81-23421

Fundamental research in turbulent modeling. Part 1: Theory. Part 2: Experiment
[AD-A097431] N81-23425

Investigation of numerical modeling techniques for recirculations flows: Parts 1 and 2
[EPRI-CS-1665-PT-1] N81-23427

TURBULENT MIXING

Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226

Multiple-scale turbulence modeling of boundary layer flows for scramjet applications
[NASA-CR-3433] N81-23411

TURBULENT WAKES

Trailing edge wake flow characteristics of upper surface blown configurations --- noise generators
[NASA-CR-152224] N81-23028

TWO DIMENSIONAL FLOW

Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051

TWO PHASE FLOW

Next steps in two-phase flow: Executive summary
[DOE/ET-27225/12] N81-23429

U

ULTRAHIGH VACUUM

ESR studies of surface adsorption and catalysts under ultrahigh vacuum conditions
[DOE/ER-04991/2] N81-23229

ULTRASONIC MACHINING

Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T2] N81-23460

Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T3] N81-23468

ULTRASONIC TESTS

Effects of surface-mapping corrections and synthetic-aperture focusing techniques on ultrasonic imaging
[EGG-FM-5314] N81-23865

ULTRAVIOLET ASTRONOMY

Documentation for the machine-readable version of an atlas of ultraviolet stellar spectra and a second atlas of ultraviolet stellar spectra from OAO 2 observations
[NASA-TM-82284] N81-23984

ULTRAVIOLET RADIATION

The solar ultraviolet source for the ionosphere and its variation N81-23508

Ultraviolet phase conjugation and its practical implications --- laser applications
[LA-UR-81-145] N81-23898

ULTRAVIOLET SPECTRA

Solar extinction radiometry
[NASA-CR-164290] N81-23993

ULTRAVIOLET SPECTROPHOTOMETERS

Space systems: An auroral imaging spectrophotometer (vacuum ultraviolet and visible)
[PB81-133621] N81-23446

UNDERGROUND STORAGE

Oregon-based activities in support of the Basalt Waste Isolation Project
[RHO-BWI-SA-42] N81-23880

Nevada nuclear waste storage investigations
[NVO-196-20] N81-23881

UNDERWATER VEHICLES

High-pressure viewports for infrared systems. Phase 1: Germanium --- underwater vehicle applications
[AD-A097089] N81-23897

UNIQUENESS THEOREM

Existence and uniqueness of solutions to a class of nonlinear-operator-differential equations arising in automated spaceship navigation
[NASA-TP-1860] N81-23182

UNITED KINGDOM
Experimental validation of the ONSOD Omega prediction method N81-23540
Use of external information services N81-23960
UNITED NATIONS
Symphonie experiments and future applications of telecommunications satellites for the United Nations network N81-23158
UNITED STATES OF AMERICA
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Soils of Israel and their similarity to soils of the United States
[AD-A097528] N81-23564
US central station nuclear electric generating units: Significant milestones, status as of October 1, 1980
[DOE/NE-0030/4(80)] N81-23700
UNIVERSE
Grand unification and possible matter-antimatter domain structure in the universe
[NASA-TM-82083] N81-23986
UNSTEADY FLOW
Unsteady transonic flow past airfoils in rigid body motion --- predicting aerodynamic forces for flutter analysis
[AD-A097142] N81-23041
Preliminary results of a study of unsteady airfoil surface pressures and turbulent boundary layers
[AD-A097560] N81-23042
Boundary Layer Effects on Unsteady Airloads
[AGARD-CP-296] N81-23044
Methods for calculating unsteady turbulent boundary layers N81-23048
Some remarks on boundary layer effects on unsteady airloads N81-23050
Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051
Experiments on a turbulent unsteady boundary layer with separation N81-23057
UPLINKING
Station stability measurement N81-24004
ISPM X-band uplink technology demonstration. Part 1: Overview N81-24006
UPPER SURFACE BLOWN FLAPS
Trailing edge wake flow characteristics of upper surface blown configurations --- noise generators
[NASA-CR-152224] N81-23028
URANUS (PLANET)
Status and future of extraterrestrial mapping programs
[NASA-CR-3390] N81-23989
URBAN DEVELOPMENT
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
URBAN PLANNING
Building under cold climates and on permafrost. Collection of papers from a US-Soviet Joint Seminar
[AD-A097516] N81-23327
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
USER MANUALS (COMPUTER PROGRAMS)
User's manual for flight Simulator Display System (FSDS)
[NASA-CR-164295] N81-23095
Electric utility value determination for wind energy. Volume 2: A user's guide
[SERI/TR-732-604-VOL-2] N81-23394
USER REQUIREMENTS
Requirements for domestic and regional telecommunications satellites: Panel discussion E N81-23172
Solar thermal electric power information user study
[SERI/TR-751-750] N81-23689
Survey of solutions to the delivery problems. Growth control of library collections N81-23963
UTAH
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
UTILITIES
Electric utility value determination for wind energy. Volume 1: A methodology
[SERI/TR-732-604-VOL-1] N81-23393
Electric utility value determination for wind energy. Volume 2: A user's guide
[SERI/TR-732-604-VOL-2] N81-23394
Photovoltaics Program Utility Interface Southwest Regional Workshop Proceedings
[NASA-CR-164284] N81-23601
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
System integration issues of residential solar photovoltaic systems
[DOE/RA-29349/01] N81-23643
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678
Economic assessment of advanced central-receiver solar-thermal power system. Executive summary
[DOE/SF-10601/T1] N81-23680
Economic assessment of advanced central-receiver solar-thermal power systems: PG and E assessment
[DOE/SF-10601/2] N81-23682
Introduction of electric vehicles into the utility system: Analysis of research needs
[EPRI-EM-1716] N81-23978

V

V/STOL AIRCRAFT
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 1: Study overview --- aerodynamic characteristics
[NASA-CR-152391-VOL-1] N81-23030
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 2: Evaluation of prediction methodologies
[NASA-CR-152391-VOL-2] N81-23031
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 3: Effects of configuration variations from baseline
[NASA-CR-152391-VOL-3] N81-23032
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 4: RALS R104 aerodynamic characteristics and comparisons with E205 configuration aerodynamic characteristics
[NASA-CR-152391-VOL-4] N81-23033
Method for predicting the jet-induced aerodynamics of V/STOL configurations in transition
[AD-A097356] N81-23043
VACANCIES (CRYSTAL DEFECTS)
High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295
Computer simulation study of the structure of vacancies in grain boundaries
[DOE/ER-05002/15] N81-23931
VACUUM DEPOSITION
High efficiency thin film CdTe solar cells
[SERI/PR-9133-1-T1] N81-23641
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
VALENCE
Correction for loss effects in valence-band XPS spectra by deconvolution
[AD-A097598] N81-23209
VALLEYS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
VALUE ENGINEERING
Development of a computer-aided method for the techno-economic evaluation of R and D projects in the mining area. Stage 1: Development of the concept and identification of application
[BMFT-FB-T-80-130] N81-23969
VALVES
Test methods and results of a study of greases for use in roto-launch valve lubrication
[AD-A097565] N81-23289
VAPOR DEPOSITION
Thin films of InP for photovoltaic energy conversion
[COO-3004-4] N81-23632
Model systems for the epitaxial growth and capping of GaAs
[AD-A097410] N81-23928
VAPOR PRESSURE
Partial pressures of gaseous HCl and H2O over aqueous solutions of HCl, AlCl3, and FeCl3
[PB81-147381] N81-23232
VARIABLE STARS
Documentation for the machine-readable version of the University of Michigan Catalogue of two-dimensional spectral types for the HD stars. Volume 2: Declinations minus 53 deg to minus 40 deg
[NASA-TM-82285] N81-23985
VECTOR ANALYSIS
Multiple objective evaluation and choicemaking under risk with partial preference information
[AD-A097418] N81-23941
VECTORS (MATHEMATICS)
Vectorization of algorithms for solving systems of difference equations
[LA-UR-81-270] N81-23836
Computer simulation of random variables and vectors with arbitrary probability distribution laws
[NASA-TP-1859] N81-23838
Three aspects of the statistics of directions
[AD-A097489] N81-23845
VEGETATION GROWTH
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
VELOCITY DISTRIBUTION
Experiments on a turbulent unsteady boundary layer with separation N81-23057
VENUS (PLANET)
Status and future of extraterrestrial mapping programs
[NASA-CR-3390] N81-23989
VENUS ATMOSPHERE
Studies of the role of metastables and doubly ionized species in the chemical and thermal structure of the Venusian and Martian ionospheres
[NASA-CR-164329] N81-23991
VERY LONG BASE INTERFEROMETRY
Radio Astronomy N81-23998
A frequency and timing subsystem for the ORION mobile unit N81-23999
VERY LOW FREQUENCIES
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754
VIBRATION
The Shock and Vibration Digest, volume 13, no. 4
[AD-A097950] N81-23483
A note on sound radiation into a uniformly flowing fluid
[NASA-CR-166177] N81-23861
VIBRATION DAMPING
A study of poultry processing plant noise control techniques
[NASA-CR-164291] N81-23863
VIBRATIONAL SPECTRA
Infrared hole - Burning spectroscopy of matrix isolated ReO4(-) molecules N81-23447
Atmospheric transmittance/radiance computer code FASCOD2
[AD-A097593] N81-23893
VIEWING
Preliminary study of head-up assessment techniques. 1: Viewing duration of instrument panel and HUD symbology using a recall methodology
[NASA-TM-78517] N81-23798
VINYL POLYMERS
Effect of vinyl and phenyl contents of silicone gum on the properties of the elastomers and cellular silicone cushions
[UCRL-53105] N81-23298
VISCOSITY
Boundary Layer Effects on Unsteady Airloads
[AGARD-CP-296] N81-23044
A numerical treatment of the dynamic motion of a zero bending rigidity cylinder in a viscous stream
[AD-A097450] N81-23426
VISCOUS FLOW
An assessment of theoretical models for viscous and transonic flow N81-23046
Oscillating supercritical airfoils in the transonic regime with viscous interactions N81-23047
Viscous effects on unsteady airloads of oscillating configurations N81-23049

Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051
Analysis of turbulent flow about an isolated airfoil using a time dependent Navier-Stokes procedure N81-23053
Experimental studies of scale effects on oscillating airfoils at transonic speeds N81-23054

VISIBILITY
Astronomical programs: A canon of solar eclipses for the years -1500 to -1000
[PB81-133555] N81-23988

VISUAL ACUITY
A basis for traceable NDE measurements
[PB81-145757] N81-23478

VISUAL PERCEPTION
A microcomputer-based signal data converter for runway visual range measurements
[AD-A097568] N81-23060
A preliminary study of head-up display assessment techniques. 2: HUD symbology and panel information search time
[NASA-TM-78536] N81-23799
Sensor image prediction techniques
[AD-A097638] N81-23895

VOICE COMMUNICATION
A study of integrated switching techniques --- voice/data multiplexers
[AD-A097243] N81-23606

VOLTMETERS
The role of microcomputers in trace metal analysis N81-23198

VORTICES
Investigation of aerodynamic characteristics of wings having vortex flow using different numerical codes
[NASA-CR-165706] N81-23034
Investigation of heat transfer in straight and curved rectangular ducts
[AD-A097368] N81-23422

W

WAFERS
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652

WAKES
Prediction of the turbulent wake with second-order closure
[NASA-CR-164294] N81-23038

WALL FLOW
Two-dimensional aerodynamic characteristics of the NACA 0012 airfoil in the Langley 8 foot transonic pressure tunnel
[NASA-TM-81927] N81-23036

WALL JETS
Investigation of the interaction of lift jets and a ground plane --- wall jet radial momentum flux from rectangular nozzles
[NASA-CR-152343] N81-23026

WARNING SYSTEMS
Detection and location of faults in onboard aircraft systems with the aid of the Automatic Fault Identification System (AFIS) N81-23022

WASTE DISPOSAL
Workshop of Arc By-Products in Gas Insulated Equipment
[EPRI-EL-80-8-LD] N81-23396
The strontium heat source development program
[PNL-1845-48] N81-23503
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560
Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585
Meteorological and air quality data report. WIPP site: Eddy County, New Mexico --- radioactive waste disposal site selection
[SAND-81-7052] N81-23779
Oregon-based activities in support of the Basalt Waste Isolation Project
[RHO-BWI-SA-42] N81-23880
Nevada nuclear waste storage investigations
[NVO-196-20] N81-23881
Review of high-level waste form properties
[PNL-3035] N81-23882

WASTE ENERGY UTILIZATION
District heating from electric-generating plants and municipal incinerators: Local planners assessment guide
[ANL/CNSV-12] N81-23699

WASTE TREATMENT
Evaluation of hot acid treatment for municipal sludge conditioning
[PB81-144446] N81-23982
Recycling of sewage effluent by sugarcane irrigation: A dilution study, October 1976 to October 1978, Phase 2-A
[PB81-144669] N81-23983

WASTE UTILIZATION
Atmospheric corrosion resistance of steels prepared from the magnetic fraction of urban refuse
[PB81-148215] N81-23265
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron
[PB81-150161] N81-23267
Silver recovery from aircraft scrap
[PB81-150021] N81-23269
Ethanol production in northern New York: Technical and economic feasibility
[PB81-144438] N81-23322
Development of analytical reference materials for refuse-derived fuels
[PB81-135030] N81-23323
Processing equipment for resource recovery systems. Volume 2: Magnetic separators, air classifier and ambient air emissions tests
[PB81-141590] N81-23324
Construction procedures using self hardening fly ash
[PB81-153884] N81-23334
Illinois biomass resources. Annual crops and residues; canning and food-processing wastes, preliminary assessment
[ANL/EMR-6] N81-23573
Recovery and separation of products from the high-temperature chlorination of fly ash
[IS-T-947] N81-23723
Chlorination of fly ash and bentonite with a gas mixture of silicon tetrachloride and chrlorine
[IS-T-920] N81-23724

WASTE WATER
Aquaculture systems for wastewater treatment: An engineering assessment
[PB81-156689] N81-23738

WATER
Partial pressures of gaseous HCl and H2O over aqueous solutions of HCl, AlCl3, and FeCl3
[PB81-147381] N81-23232
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary
[SAN-0307-1-VOL-1] N81-23671
Solar Thermal Enhanced Oil Recovery (STEOR), volume 2, sections 2-8
[SAN-0307-1-VOL-2] N81-23672
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 2: Appendices
[SAN-0307-1-VOL-2-APP] N81-23673
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility
[SAN-0307-1-VOL-3] N81-23674

WATER CONSUMPTION
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
Ground water overdrafting must be controlled
[PB81-156135] N81-23589

WATER FLOW
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Ground water overdrafting must be controlled
[PB81-156135] N81-23589

WATER HEATING
Solar heating and hot water system installed at Charlotte Memorial Hospital, Charlotte, North Carolina
[NASA-CR-161731] N81-23606
Assessment of the solar heating and cooling in residential building demonstration program
[DOE/PE-70278/T10] N81-23698

WATER POLLUTION
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee --- envrionment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model --- environment impact of thermal discharges from power plants
[NASA-CR-165623-VOL-7] N81-23560
Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585
Exploratory benefit-cost analysis of environmental controls on hydrothermal energy
[PNL-3527] N81-23725

WATER QUALITY
Remote sensing of water quality in reservoirs and lakes in semi-arid climates
[NASA-CR-166178] N81-23553
Underground residence times and chemical quality of basal groundwater in Pearl Harbor and Honolulu aquifers, Oahu, Hawaii
[PB81-135444] N81-23577
Water resources data for Arkansas, water year 1979
[PB81-144842] N81-23579

Water resources data for Alaska, water year 1979
[PB81-144818] N81-23580
Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785

WATER RESOURCES
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
Water resources data for Arkansas, water year 1979
[PB81-144842] N81-23579
Water resources data for Alaska, water year 1979
[PB81-144818] N81-23580
Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987
[PB81-134918] N81-23585
Ground water overdrafting must be controlled
[PB81-156135] N81-23589
Environmental issues and site selection criteria for small hydropower projects in developing countries
[ORNL/TM-7620] N81-23720

WATER TEMPERATURE
Heat Capacity Mapping Mission (HCMM) thermal surface water mapping and its correlation to LANDSAT --- Lake Anna, Virginia
[E81-10137] N81-23546

WATER TREATMENT
Aquaculture systems for wastewater treatment: An engineering assessment
[PB81-156689] N81-23738

WATER VAPOR
ORION: Microwave water vapor radiometer subsystem design N81-24000

WATER WAVES
A general inverse solution for 2D edge waves
[AD-A097683] N81-23748

WATERSHEDS
Dryland pasture and crop conditions as seen by HCMM --- Washita River watershed, Oklahoma
[E81-10131] N81-23544

WAVE ATTENUATION
Attenuation and coupling of far infrared surface plasmons N81-23888

WAVE DISPERSION
Atmospheric microwave refractivity and refraction
[NASA-CR-164339] N81-23739

WAVE FRONTS
Advanced wavefront sensor concepts
[AD-A097187] N81-23391

WAVE PROPAGATION
Analytic model and numerical simulation of shock wave propagation into a reentrant corner
[AD-A097471] N81-23423
The generation and propagation of atmospheric gravity waves with special reference to radio propagation N81-23535
Superrotation planetary atmospheres: Mechanical analogy, angular momentum budget and simulation of the spin up process
[NASA-TM-82137] N81-23987

WAVE REFLECTION
Termination of surface acoustic wave velocity and impedance differences between metal strips and free surface regions of metallic gratings
[AD-A097337] N81-23386

WAVEFORMS
Response of nickel to zinc cells to electric vehicle chopper discharge waveforms
[NASA-TM-81713] N81-23608

WAVEGUIDES
Electromagnetic scattering by open circular waveguides --- engine inlets N81-23339

WAVELENGTHS
A note on sound radiation into a uniformly flowing fluid
[NASA-CR-166177] N81-23861
Wavelength division multiplexing: Overview of the state of the art
[AD-A097587] N81-23896

WEAK INTERACTIONS (FIELD THEORY)
Virtual photoproduction of hidden and open charm
[LBL-11844] N81-23870

WEAPON SYSTEM MANAGEMENT
Weapons system support resources demand parameters - logistics
[AD-A097517] N81-23937

WEAPON SYSTEMS
Development of maintenance METRICS to forecast resource demands of weapon systems (parameter polarization), revision A
[AD-A097692] N81-23325
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 1: NDI maintenance data analysis
[AD-A097669] N81-23938
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 2: On-site data collection
[AD-A097670] N81-23939

WEAR
X-ray fluorescence spectrometric analysis of wear metals in used lubricating oils
[AD-A097552] N81-23087

WEATHER
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Weather scenarios for central Germany
[AD-A097527] N81-23771

WEATHER FORECASTING
Tropical cyclone forecast verification as a function of reconnaissance platform
[AD-A097454] N81-23775
Low-level convergence and the prediction of convective precipitation in south Florida
[AD-A097553] N81-23777
An investigation of marine fog forecast concepts
[AD-A097338] N81-23778

WEIBULL DENSITY FUNCTIONS
Asymptotic power of EDF statistics for exponentiality against Weibull and Gamma alternatives
[AD-A097107] N81-23841

WEIGHT (MASS)
Design, development, and evaluation of lightweight hydraulic system, phase 1 --- A-7 aircraft
[AD-A097505] N81-23075

WEIGHT ANALYSIS
Aircraft wing weight build-up methodology with modification for materials and construction techniques
[NASA-CR-166173] N81-23068

WELD STRENGTH
X-ray diffraction study of residual stress in model weldments
[UCRL-15332] N81-23504

WELDED JOINTS
Manufacturing process feasibility study
[UCRL-15319] N81-23251

WELDING
Weld overlaying for corrosion resistance in coal-gasification atmospheres
[FE-2621-15] N81-23254

WELLS
Testing geopressured geothermal reservoirs in existing wells
[DOE/ET-27081/2] N81-23570
Water resources data for Alaska, water year 1979
[PB81-144818] N81-23580
Review of the geothermal reservoir well stimulation program
[LA-UR-81-26] N81-23701
Geothermal energy geopressure subprogram
[DOE/EA-0134] N81-23721

WET CELLS
Molten carbonate fuel cell system verification and scale-up
[EPRI-EM-1481] N81-23651

WETLANDS
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586

WHEAT
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548

WILDLIFE
Indentifying environmental features for land management decisions --- Uinta Basin, Davis County foothills, and Farmington Bay in Utah
[E81-10142] N81-23551

WIND (METEOROLOGY)
Physical environment of the Eastern Bering Sea, March 1979
[PB81-148496] N81-23786

WIND DIRECTION
Evaluation of a tethered kite anemometer
[AD-A097082] N81-23440

WIND SHEAR
Midlatitude sporadic-E layers N81-23530
Groundspeed/airspeed differences as a wind shear indicator and flight evaluation of a DME-derived system to determine groundspeed
[AD-A097566] N81-23768

WIND TUNNEL APPARATUS
Characteristics, performances and testing capabilities of four main European subsonic wind-tunnels (RAE-5 m, ONERA FL and SIMA, DNW)
[AC/243(CC)D/12] N81-23094

WIND TUNNEL MODELS
An analytical procedure and automated computer code used to design model nozzles which meet MSFC base pressure similarity parameter criteria --- space shuttle
[NASA-CR-161757] N81-23187

WIND TUNNEL TESTS
Two-dimensional aerodynamic characteristics of the NACA 0012 airfoil in the Langley 8 foot transonic pressure tunnel
[NASA-TM-81927] N81-23036
Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel
[NASA-TM-81285] N81-23039
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065
Comparison of theoretical predictions of orbiter airloads with wind tunnel and flight test results for a Mach number of 0.52
[NASA-TM-81358] N81-23066
Transonic flutter study of a wind-tunnel model of an arrow-wing supersonic transport --- SCAT-15F model test in the Langley Transonic Dynamics Tunnel
[NASA-TM-81962] N81-23071
Characteristics, performances and testing capabilities of four main European subsonic wind-tunnels (RAE-5 m, ONERA FL and SIMA, DNW)
[AC/243(CC)D/12] N81-23094

WIND VARIATIONS
Mesoscale variability of the atmospheric wind field below 5 km
[AD-A097414] N81-23773

WIND VELOCITY
Evaluation of a tethered kite anemometer
[AD-A097082] N81-23440

WIND VELOCITY MEASUREMENT
Feasibility study of satellite-borne lidar global wind monitoring system, part 2
[PB81-145369] N81-23781

WINDMILLS (WINDPOWERED MACHINES)
MOD-OA 200 kW wind turbine generator engineeringing
[NASA-CR-165129] N81-23598

WINDOWS (APERTURES)
High temperature solar receiver
[NASA-CR-164332] N81-23614
Solar passive ceiling system
[DOE/R5-10148/2] N81-23637
High-pressure viewports for infrared systems. Phase 1: Germanium --- underwater vehicle applications
[AD-A097089] N81-23897
WINDPOWER UTILIZATION
Electric utility value determination for wind energy. Volume 2: A user's guide
[SERI/TR-732-604-VOL-2] N81-23394
Wind energy resource atlas. Volume 9: The Southwest region --- Nevada and California
[PNL-3195WERA-9-VOL-9] N81-23634
Large wind turbine generator performance assessment
[EPRI-AP-1641] N81-23645
WINDPOWERED GENERATORS
Electric utility value determination for wind energy. Volume 1: A methodology
[SERI/TR-732-604-VOL-1] N81-23393
MOD-OA 200 kW wind turbine generator engineeringing
[NASA-CR-165129] N81-23598
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
Large wind turbine generator performance assessment
[EPRI-AP-1641] N81-23645
WING LOADING
Comparison of theoretical predictions of orbiter airloads with wind tunnel and flight test results for a Mach number of 0.52
[NASA-TM-81358] N81-23066
WING OSCILLATIONS
An asymptotic unsteady lifting-line theory with energetics and optimum motion of thrust-producing lifting surfaces
[NASA-CR-165679] N81-23035
Introductory remarks on boundary layer effects on unsteady airloads N81-23045
Oscillating supercritical airfoils in the transonic regime with viscous interactions N81-23047
Viscous effects on unsteady airloads of oscillating configurations N81-23049
Some remarks on boundary layer effects on unsteady airloads N81-23050
Experimental studies of scale effects on oscillating airfoils at transonic speeds N81-23054
Some remarks on the unsteady airloads on oscillating control surfaces in subsonic flow N81-23055
WING PROFILES
Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051
Experimental flutter at high subsonic speeds and its theoretical prediction, taking into account wing thickness and Reynolds number N81-23052
WINGS
An asymptotic unsteady lifting-line theory with energetics and optimum motion of thrust-producing lifting surfaces
[NASA-CR-165679] N81-23035
Aircraft wing weight build-up methodology with modification for materials and construction techniques
[NASA-CR-166173] N81-23068
WINTER
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780
WIRELESS COMMUNICATIONS
Single Channel Per Carrier (SCPC)-FM system N81-23120
WIRING
Guide to substation grounding and bonding for mine power systems
[PB81-148264] N81-23592
WISCONSIN
Improving streamflow estimates through the use of LANDSAT --- Wisconsin and Pecatonica-Sugar River basins
[E81-10129] N81-23542
WOOD
Advanced system demonstration for utilization of biomass as an energy source, executive summary
[DOE/ET-20055/T3-EXEC-SUMM] N81-23596
Advanced system demonstration for utilization of biomass as an energy source. Site study report --- site selection in Maine
[DOE/ET-20055/T1] N81-23662
Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-1] N81-23665
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3, book 2: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-2] N81-23666
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668
WORKING FLUIDS
Analyses of mixed-hydrocarbon binary thermodynamic cycles for moderate-temperature geothermal resources
[EGG-PG-G-80-041] N81-23644
WORKLOADS (PSYCHOPHYSIOLOGY)
Effects of criteria on flight simulation. Study 2: Multiple criteria
[AD-A097526] N81-23794
WYOMING
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States
[E81-10139] N81-23548
Western energy related overhead monitoring project. Phase 2: Summary --- Campbell County, Wyoming and coal strip mines in Montana and New Mexico
[E81-10141] N81-23550

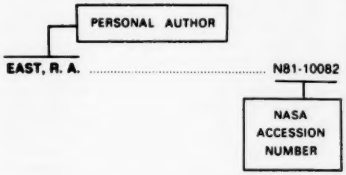
X

X RAY ANALYSIS
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489
X-ray diodes for laser fusion plasma diagnostics
[LA-7941-MS] N81-23904
X RAY DIFFRACTION
X-ray diffraction measurement of residual stress (strain): Energy dispersive X-ray residual stress measurement N81-23480
X-ray diffraction study of residual stress in model weldments
[UCRL-15332] N81-23504
X RAY FLUORESCENCE
X-ray fluorescence spectrometric analysis of wear metals in used lubricating oils
[AD-A097552] N81-23087
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste
[BNL-28668] N81-23228
X RAY SPECTRA
Correction for loss effects in valence-band XPS spectra by deconvolution
[AD-A097598] N81-23209
MFTF Thomson scattering: A system study
[UCRL-53051] N81-23371
X RAY SPECTROSCOPY
X-ray fluorescence spectrometric analysis of wear metals in used lubricating oils
[AD-A097552] N81-23087
XV-15 AIRCRAFT
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies
[NASA-CR-152336-1] N81-23064
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data
[NASA-CR-152336-2] N81-23065

Y

YIELD
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains --- United States of America
[E81-10138] N81-23547

Typical Personal Author Index Listing



Listings in this Index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

ABBINK, F. J. N81-23020
ABT, B. N81-23139
ABUELNAGA, A. M. N81-23403
ADAMANTIADES, A. G. N81-23397
ADAMS, W. A. N81-23206
ADLER, T. N81-23596
AGARWAL, A. K. N81-23272
AHMADI, A. R. N81-23035
AKERS, F. I. N81-23891
AKIN, J. E. N81-23899
ALAM, K. N81-23851
ALEXANDER, H. R. N81-23064
ALLARIO, F. N81-23742
ALLEMANG, R. J. N81-23481
ALLEN, D. N81-23671
N81-23672
N81-23673
N81-23674
ALLEN, E. L. N81-23642
ALLIN, L. V. N81-23441
ALLORD, G. J. N81-23542
ALTMAN, K. N81-23596
AMMONS, J. M. N81-23710
ANDERSEN, T. S. N81-23598
ANDERSON, C. F. N81-23299
ANDERSON, H. M. N81-23553
ANDERSON, J. E. N81-23549
N81-23550
ANDERSON, R. C. N81-23435
ANDERSON, S. B. N81-23568
ANDERSON, T. W. N81-23840
ANDERSON, W. J. N81-23462
ANDERSON, W. W. N81-23661
ANDES, F. S. N81-23630
ANDREWS, J. W. N81-23063
ANGELINI, J. J. N81-23051
ANGELO, J. A., JR. N81-23173
ANTONOPOULOS, A. A. N81-23573
APRAHAMIAN, R. N81-23454
APRIL, G. C. N81-23785
ARI, N. N81-23463
ARJOMANDI, E. N81-23381
ARMSTRONG, J. A. N81-23734
ARNOLD, C. N81-23671
N81-23672
N81-23673
N81-23674
ARRINGTON, C. H., III N81-23648
ASARE, H. R. N81-23919
ASSEL, R. A. N81-23780
AST, D. N81-23618
AST, D. G. N81-23933
ASTLING, E. N81-23770
ATABAY, K. N81-23308
ATHALE, R. A. N81-23886

B

BABELAY, E. F., JR. N81-23697
BABIJ, E. N81-23779
BACHERT, R. F. N81-23801
BAGANOFF, D. N81-23433
BAIN, C. N. N81-23617
BAKER, C. C. N81-23907
BALAZS, P. N81-23331
BALDASSARI, M. N81-23308
BALL, J. M. N81-23828
BALLARD, J. C., III N81-23422
BALLUFFI, R. W. N81-23931
BANDEEN, W. R. N81-23742
BANDYOPADHYAY, N. N81-23236
BAR-SHALOM, Y. N81-23350
BARAB, J. D. N81-23769
BARAN, H. A. N81-23083
N81-23084
BARATHY, S. N81-23138
BARCHET, W. R. N81-23634
BARKAN, B. N81-23562
BARKER, B. N81-23717
BARKER, W. R. N81-23333
BARLOW, P. R. N81-23039
BARNA, B. A. N81-23865
BARON, A. N81-23057
BARRAR, R. N81-23939
BARSCHDORF, D. N81-23015
BARTER, J. D. N81-23903
BASS, J. C. N81-23638
BASU, J. N81-23111
N81-23168
BATHO, E. K. N81-23790
BATSON, R. M. N81-23989
BAUER, E. K. N81-23655
BAUER, P. N81-23524
BAUFELDT, K. E. N81-23653
BEARD, R. M. N81-23467
BEATIE, M. N81-23596
BECK, B. N81-23489
BEESON, J. L. N81-23314
BEHL, W. K. N81-23211
BEISWENGER, C. R. N81-23457
BEIYIAN, L. N81-23123
BELEW, W. W. N81-23689
N81-23690
N81-23691
BELL, D. M. N81-23623
BELLMAN, R., JR. N81-23255
BENDERSKY, D. N81-23324
BENECKE, W. N81-23021
BENFORD, S. M. N81-23245
BENGELSDORF, I. S. N81-23601
BENNETT, L. D. N81-23434
BENSON, J. D. N81-23628
BENTLEY, J. R. N81-23301
BERG, D. E. N81-23811
BERGER, H. N81-23478
BERGERON, K. D. N81-23702
BERMAN, M. R. N81-23455
BERMUDEZ, J. M. N81-23794
BERNARD, M. J., III N81-23722
BERRY, L. N81-23895
BERSTEIN, S. N81-23395
BERTEAUX, H. O. N81-23782
BERTSEKAS, D. P. N81-23835
BETTS, J. A. N81-23454
BETTS, W. S., JR. N81-23866
BEUS, M. J. N81-23591
BEVAN, A. N81-23070
BHAUMIK, D. N81-23284
BIGNON, J. N81-23731
BILLINGSLEY, F. C. N81-23583
BILLION-GALLARD, M. A. N81-23731
BILLOT-PIOT, F. N81-23155
BIRINGEN, S. N81-23027
BIRNBAUM, G. N81-23478
BISHOP, B. L. N81-23443
BISOGNANO, J. N81-23910
BIXLER, W. D. N81-23242
BLAIR, J. N81-23704
BLANC, M. N81-23517
BLANCHARD, B. J. N81-23544
BLANCHARD, D. O. N81-23777
BLEVINS, R. D. N81-23866
BLICKENSDERFER, R. N81-23476
BLOOMFIELD, P. N81-23844
BLUM, D. N81-23647
BLUM, N. A. N81-23648
BODENSCHATZ, C. A. N81-23598
BOECK, G. N81-23137
BOERICKE, R. R. N81-23091
N81-23092
BOGDAN, V. M. N81-23182
N81-23838
BOGDONOFF, S. M. N81-23415
BOHN, J. G. N81-23978
BOISVERT, R. N. N81-23322
BOLDY, M. D. N81-23250
BOND, G. N. N81-23636
BONDS, T. L. N81-23694
BORGER, W. N81-23653
BOSSY, L. N81-23525
BOTTOMLEY, L. A. N81-23197
BOUCHER, J. H. N81-23636
BOURCIER, H. N81-23165
BOWKER, J. K. N81-23391
BOWMAN, B. M. N81-23804
BOYD, S. T. N81-24018
BOYLE, R. F. N81-23681
N81-23682
BRADFORD, R. S., JR. N81-23454
BRADLEY, P. A. N81-23537
BRADLEY, W. L. N81-23195
BRAEUTIGAM, R. N81-23653
BREEN, J. J. N81-23729
BREKKE, A. N81-23518
N81-23519
N81-23521
BREMMER, R. J. N81-23420
BRENKEN, W. N81-23370
BRENNON, R. L. N81-23089
BRETTING, J. N81-23162
BRICK, D. B. N81-23352
BRIDGMAN, M. S. N81-23477
BRINSON, H. F. N81-23193
BRISTOL, M. A. N81-23083
N81-23084
BRISTOWE, P. D. N81-23931
BRITTAIN, R. D. N81-23210
BROECKER, W. S. N81-23783
BROKMAN, A. N81-23931
BRONISZ, S. E. N81-23189
BROOKS, J. N. N81-23907
BROOMAN, E. W. N81-23706
BROUTMAN, L. J. N81-23196
BROWN, C. N81-23594
N81-23692
BROWN, E. R. N81-23073
BROWN, G. M. N81-23536
BROWN, H. K. N81-23374
BROWN, K. N81-23727
BROWN, L. N81-23596
BROWN, S. B. N81-23252
BRUNET, M. N81-23134
BRYANT, J. N81-23561
BUCKNER, A. T. N81-23298
BUECHS, J. D. N81-23120
BUHL, D. N81-23448

BULZAN, D. L. N81-23609
BURELLO, M. N81-23148
BURKE, W. R. N81-23759
BURKHARDT, R. N81-23127
N81-23129
BURMASTER, N. C. N81-23073
BURNS, K. J. N81-23703
BURNSIDE, W. D. N81-23353
BURRUS, J. M. N81-23475
BURTON, L. C. N81-23683
N81-23684
BUTMAN, S. A. N81-24012
BUZBEE, B. L. N81-23836

C

CADA, G. F. N81-23720
CADY, W. E. N81-23298
CAINES, M. J. N81-23292
CALES, G. N81-23146
N81-23150
CALHOUN, M. D. N81-23810
CALISE, A. J. N81-23093
CALKINS, D. N81-23737
CALLA, O. P. N. N81-23111
CALLAHAN, D. N81-23944
CALLINAN, R. J. N81-23024
CALVIN, M. N81-23220
N81-23222
N81-23223
CAMPBELL, A. B., III N81-23270
CAMPBELL, D. A. N81-23701
CAMPBELL, W. H. N81-23744
CAMPBELL, W. J. N81-23323
CARHOUN, D. O. N81-23816
CARLSON, G. A. N81-23922
CARLTON, R. N81-23623
CARNEY, J. N81-23686
CARPENTER, R. L. N81-23718
CARTER, A. L. N81-23066
CARTER, J. P. N81-23265
CARTIER, A. N81-23107
CARTON, C. N81-23166
CASEY, E. J. N81-23206
CATALDO, R. L. N81-23608
CATIZONE, P. A. N81-23779
CERASOLI, C. N81-23425
CERVIK, J. N81-23590
CHAIKEN, R. F. N81-23234
CHAMBERS, D. H. N81-23269
CHAMEIDES, W. L. N81-23742
CHAN, S. S. M. N81-23591
CHANDOKE, A. N81-23427
CHANG, I. C. N81-23041
CHANG, M. K. N81-23832
CHARTRAND, R. L. N81-23965
CHASE, A. B. N81-23385
CHASE, D. N81-23367
CHEN, C. H. N81-23822
CHEN, F. M. N81-23770
CHERN, L. N81-23785
CHEVRAY, R. N81-23226
CHEW, H. W. N81-23869
CHI, M. R. N81-23046
CHIANG, C. Y. N81-23857
CHIN, G. N81-23448
CHIN, J. N81-23638
CHIN, R. C. Y. N81-23757
CHINNIS, J. O., JR. N81-23839
CHIU, Y. T. N81-23741
CHOCK, E. P. N81-23212
CHOU, T. T. N81-23877
CHOU, U. T. N81-23333
CHRAPLYVY, A. R. N81-23447
CHRISTOPHOROU, L. G. N81-23875
CHU, E. K. N81-23215
CHUBB, D. L. N81-23611
CHUNG, Y. W. N81-23262
CHURCH, H. W. N81-23779
CIRILLO, R. N81-23692
CLARK, A. R. N81-23870
CLARK, E. J. N81-23709
CLARK, S. K. N81-23461
CLAYTON, C. R. N81-23466
CLEARFIELD, H. M. N81-23927
CLEMENTS, P. A. N81-23999
CLIFFORD, J. E. N81-23706
CLYMER, S. J. N81-23818
COCHRAN, A. A. N81-23263
COFFEY, C. S. N81-23305
COFFEY, H. E. N81-23994
N81-23995
COGLEY, A. C. N81-23893
COHEN, C. N81-23765
COHEN, L. M. N81-23216
COHEN, M. J. N81-23660
COHEN, R. E. N81-23287
COLAK, S. N81-23451
COLE, G. E., JR. N81-23821
COLE, H. E. N81-23639
COLEMAN, J. A. N81-23688
COLEMAN, J. R. N81-23206
COLLIER, B. N. N81-23727
COLVOCORESSES, A. P. N81-23546
CONN, A. P. N81-23821
CONNELLY, R. E. N81-23188
CONNER, G. R. N81-23266
CONRATH, B. J. N81-23987
N81-23990
CONWAY, J. B. N81-23246
COOLEY, W. L. N81-23592
COOPER, W. A. N81-23906
CORLEY, W. G. N81-23329
CORNELIUS, C. J. N81-23797
CORNELIUS, K. A. N81-23628
CORNWALL, J. M. N81-23741
CORSIGLIA, V. R. N81-23039
COSTOLLOE, S. P. N81-23249
COUSTEIX, J. N81-23048
COUSTON, M. N81-23051
COVERT, E. E. N81-23042
COVINO, B. S., JR. N81-23265
N81-23266
N81-23270
COWLEY, S. W. H. N81-23510
COX, J. E. N81-23354
N81-23355
COYLE, C. W. N81-24001
COZZARELLI, F. A. N81-23497
CRAMER, S. D. N81-23265
CRESS, T. S. N81-23750
CRETER, C. N81-23676
CROCHET, M. N81-23532
CRONE, J. N81-23977
CROSBIE, A. L. N81-23584
CRUETZ, M. N81-23932
CUIYING, X. N81-23135
CUNNING, J. B. N81-23777
CUNNINGHAM, B. N81-23618
CURRIE, J. W. N81-23725

D

DADONE, L. N81-23070
DAHL, G. N81-23012
N81-23016
DALEY, D. J. N81-23827
DANGELO, J. C. N81-23399
DARAGONA, F. S. N81-23930
DATTA, S. N81-23386
DAUGHERTY, L. A. N81-23564
DAVENPORT, E. L. N81-23793
DAVIDOWSKI, L. J. N81-23198
DAVIDSON, G. W. N81-23584
DAVIDSON, K. L. N81-23752
DAVIDSON, R. H. N81-23901
DAVIS, B. E. N81-23581
DAVIS, D. D. N81-23742
DAVIS, G. D. N81-23209
DAVIS, J. L. N81-23357
DAVIS, J. R. N81-23613
DAVIS, S. S. N81-23054
DAVISON, A. N81-23784
DAVISON, C. N81-23642
DAWES, M. H. N81-23694
DAY, J. T. N81-23681
N81-23682
DAY, R. H. N81-23904
DAYMAN, B. N81-23975
DEAKIN, E. N81-23737
DEBAY, P. N81-23149
DEBOER, P. C. T. N81-23320
DEBOO, G. J. N81-23434
DECARLO, J. N81-23676
DECHEZELLES, J. J. N81-23149
N81-23150
DEEHR, C. S. N81-23533
DEGAN, L. J. N81-23708
DEIXELBERGER, F. N81-23147
DELFINO, J. J. N81-23578
DELNICK, F. M. N81-23399
DELOACH, R. N81-23713
DEMARCHI, J. N. N81-23075
DEMERLIAC, M. Y. N81-23154
DEMING, D. N81-23448
DEMUTH, O. J. N81-23644
DENSION, M. R. N81-23216
DEPONTE, S. N81-23057
DERECHO, A. T. N81-23329
DESHPANDE, G. N81-23975
DESTER, R. N. N81-23903
DESVIGNES, F. N81-23165
DEUTSCH, L. J. N81-24012
DEUTSCH, S. N81-23416
DEVOGE, J. N81-23961
DICKINSON, J. T. N81-23194
DIDALEUSKY, D. G. J. N81-23825
N81-23826
DIFLEY, J. N81-23596
DILLARD, D. A. N81-23193
DIPIPPO, R. N81-23429
DIXON, J. M. N81-23318
DIXON, P. G. N81-23064
DOAR, D. W. N81-23681
N81-23682
DODGE, R. N. N81-23461
DODSON, D. J. N81-23387
DOITTAU, F. X. N81-23165
DOMINICI, P. N81-23541
DONALDSON, E. E. N81-23194
DONCHIN, E. N81-23795
DONGRUN, J. N81-23136
DONOVAN, J. C. N81-23925
DONVITO, M. B. N81-23336
DORHAM, R. N81-24016
DOUGHER, R. N81-23642
DOUGLAS, T. S. N81-23715
DOWDEN, R. L. N81-23521
DOWELL, E. H. N81-23046
DRAGO, R. S. N81-23285
DREVER, J. E. N81-23073
DREYFUSS, P. N81-23281
DROOKS, L. J. N81-23899
DUCHON, C. E. N81-23767
DUEDALL, I. W. N81-23228
DUFFIE, N. A. N81-23458
DUFOUR, G. N81-23731
DUGAN, G. L. N81-23983
DUGAN, V. L. N81-23702
DUNCAN, D. A. N81-23314
DUNCAN, L. D. N81-23772
DUNIAU, J. M. N81-23108
DUNNING, B. W., JR. N81-23269
DUNNING, J. S. N81-23268
DUPUY, C. N81-23018
DUQUETTE, D. J. N81-23261
DURHAM, M. N81-23734
DUSKIN, F. E. N81-23058
DYBDAL, R. B. N81-23364

E

EASON, E. D. N81-23252
EBEL, B. N81-23146
N81-23150
EBERHARDT, W. N81-23276
ECKERT, J. N81-23442
EDELMAN, R. B. N81-23411
EDEN, A. N81-23628
EDMONDS, J. A. N81-23642
EDWARDS, T. B. N81-23856
EGELAND, A. N81-23533
EGERDAHL, C. C. N81-23095
EGGERS, A. G. N81-23598
EHST, D. A. N81-23907
N81-23915
EICHLER, C. H. N81-23678
EISENSTADT, M. N81-23635
EISENSTEIN, B. N81-23443
EITZEN, D. G. N81-23478
EKERN, P. C. N81-23983
EKPOOM, U. N81-23237
EL-AKKARI, F. R. N81-23887
ELAMMA, A. G. N81-23285
ELDER, J. N81-23335
ELISCHER, P. P. N81-23301
ELLERSICK, F. W. N81-23352

ELLIOTT, D. L. N81-23634
ELNOUBI, S. M. N81-23338
ELSAYED, M. A. N81-23212
ELSNER, N. B. N81-23638
ELWORTH, C. N81-23802
ELZINGA, E. N81-23671
N81-23672
N81-23673
N81-23674
EMBREE, E. J. N81-23709
ENGLER, H. F. N81-23793
ENSIGN, C. R. N81-23486
ENTINE, G. N81-23641
N81-23659
ERDMANN, J. B. N81-23097
ERIKSEN, W. T. N81-23636
ERIKSSON, A. N81-23330
ERINGEN, A. C. N81-23463
ERNSBERGER, K. N81-23142
ERSKINE, D. N81-23623
ESPENAK, F. N81-23448
ESTIVALS, J. N81-23126
ETTEHADIEH, B. N81-23707
EVANS, D. D. N81-23400
EVANS, K. E., JR. N81-23907
EVANS, M. A. N81-23318
EWEN, R. L. N81-23184
N81-23186
EYFRIG, R. N81-23539
EYRE, P. N81-23577
EYSTER, J. M. N81-23571
N81-23572

F

FABIS, B. N81-23170
FABRIS, G. N81-23411
FABUNMI, J. A. N81-23487
FAGG, A. S. N81-23143
FAIRALL, C. W. N81-23752
FAROOQUE, M. N81-23600
FARRELL, T. G. N81-23438
FEINLEIB, J. N81-23391
FELDMAN, B. J. N81-23898
FELDMAN, C. N81-23648
FERRARI, I. N81-23441
FERSCHL, M. S. N81-23976
FIENUP, J. R. N81-23894
FINFINGER, G. L. N81-23590
FINN, P. A. N81-23907
FINNEY, J. M. N81-23493
FISCHER, M. J. N81-23381
FISHER, R. A. N81-23898
FISK, M. B. N81-23747
N81-23758
FLANNELLY, W. G. N81-23487
FLEMINGS, M. C. N81-23250
FLEMMING, L. N81-23909
FLIPSE, J. E. N81-23430
FLOYD, P. H. N81-23088
FOERSCHING, H. N81-23055
FOLIARD, J. N81-23148
FONI, A. N81-23144
FORBES, J. N81-23522
FORD, D. G. N81-23498
FORMAN, S. E. N81-23650
FORTGANG, C. M. N81-23903
FORTMANN, T. E. N81-23350
FOX, J. N81-23935
FOX, J. L. N81-23991
FRANCK, D. E. N81-23938
N81-23939
FRANK, A. M. N81-23371
FRANKEL, M. J. N81-23305
FRANKENFELD, J. W. N81-23316
FRANKFORT, M. N81-23347
FRAZER, J. Z. N81-23747
N81-23758
FREED, J. H. N81-23229
FREELING, A. N. S. N81-23839
N81-23850
FREMONT, H. A. N81-23982
FRIERSON, B. N81-23696
FROCK, S. N81-23647
FROEHNER, F. H. N81-23884
FRUEH, J. T. N81-23083
N81-23084
FRUMKIN, H. A. N81-23311
FRYE, D. N81-23784
FUESSL, B. N81-23652
FUJII, T. N81-23250
FUJIOKA, R. S. N81-23983
FULLAM, H. T. N81-23503
FULLER, R. E. N81-23639
FUNK, K. H., II N81-23796
FURUTA NAOKI N81-23231
FUSARO, R. L. N81-23275

G

GABERSON, H. A. N81-23755
GABLER, E. C. N81-23322
GABRIEL, T. A. N81-23443
GAFNI, E. M. N81-23835
GALLAGER, R. G. N81-23835
GALLAGHER, A. C. N81-23449
GAMBLE, D. R. N81-23360
GAMBLE, R. B. N81-23345
N81-23346
GANIN, E. N81-23247
GANNON, J. D. N81-23809
GANNON, P. T. N81-23777
GANNON, T. L. N81-23375
GANTZEL, P. K. N81-23638
GARBER, W. A. N81-23385
GARCILAZO, H. N81-23874
GARMAN, R. N81-23671
N81-23672
N81-23673
N81-23674
GARNER, H. C. N81-23052
GASKILL, D. W. N81-23780
GASPER, J. R. N81-23594
N81-23692
N81-23722
GASS, M. N81-23104
GAT, N. N81-23216
GATZKE, A. E. N81-23695
GAUSMAN, H. W. N81-23543
GAY, G. T. N81-23717
GAYDA, J. N81-23244
GEFFEN, N. N81-23424
GEISSLER, W. N81-23049
GELB, A. N81-23219
GELBRICH, H. J. N81-23125
GELLER, E. W. N81-23395
GENT, A. N. N81-23281
N81-23282
N81-23283
GEORGE, R. L. N81-23634
GERSHWIN, S. B. N81-23859
GEYER, H. K. N81-23908
GHASSEMZADEH, M. R. N81-23404
GIBELING, H. J. N81-23053
GIDASPOW, D. N81-23707
GIESCHEN, N. N81-23137
GIESE, R. F. N81-23722
GILL, P. E. N81-23830
GIRODROUX-LAVIGNE, P. N81-23051
GJERDE, D. T. N81-23221
GLASIER, J. M. N81-23083
N81-23084
GLAZE, L. W. N81-23026
GLEEN, M. L. N81-23268
GLIDDEN, W. T., JR. N81-23596
GOCLOWSKI, J. C. N81-23083
N81-23084
GODLEWSKI, M. P. N81-23625
GOELTZ, R. N81-23686
GOESCHEL, W. N81-23163
GOGLIA, G. L. N81-23034
GOKCEN, N. A. N81-23232
GOLDBERG, R. A. N81-23520
GOLDMAN, A. N81-23993
GOLDMAN, H. N81-23622
GOLDNER, R. B. N81-23641
GOLDSMITH, R. L. N81-23982
GOLDSTEIN, M. L. N81-23900
GOLDSTONE, I. N81-23442
GOODMAN, H. J. N81-23423
GOODMAN, M. S. N81-23443
GORADIA, C. N81-23626
GORDON, B. A. N81-23617
GORDON, J. I. N81-23749
GOROCH, A. K. N81-23776
GOSSETT, C. R. N81-23486
GOVIGNON, J. P. N81-23183
GRAHAM, J. L. N81-23361
GRANNEMAN, E. H. A. N81-23456
GRANT, J. R. N81-23073
GRANT, N. J. N81-23914
GRAPER, H. N81-23251
GREEN, J. N81-23793
GREENBERG, M. N81-23061
GREENWALD, A. N81-23382
GREUTER, F. N81-23276
GREY, D. A. N81-23091
N81-23092
GRIMES, J. W. N81-23709
GRISWOLD, W. H. N81-23279
GROSE, W. L. N81-23761
GROSS, S. H. N81-23534
GUAY, G. A. N81-23775
GUBIOTTI, R. N81-23945
GUERCIO, J. G. N81-23799
GUEST, J. A. N81-23867
GUINN, J. W., III N81-23279
GULLEDGE, T. R. N81-23967
GUPTA, S. S. N81-23843
GUPTA, Y. M. N81-23278
GUSEMAN, L. F., JR. N81-23561
GUSTIN, H. J. N81-23122

H

HABEGGER, L. J. N81-23594
N81-23692
HABER, I. N81-23910
HAFKER, W. R. N81-23588
HAGE, M. N81-23649
HAGERTY, J. J. N81-23621
HAGGARD, K. V. N81-23761
HAINES, R. F. N81-23798
N81-23799
HAISLER, W. E. N81-23195
HAJI-SAEID, S. M. N81-23872
HALL, H. K., JR. N81-23277
HALL, J. W. N81-23247
HALLER, E. E. N81-23790
HAM, J. S. N81-23195
HAMROCK, B. J. N81-23490
HANES, M. H. N81-23613
HANG, Y. D. N81-23322
HANING, R. K. N81-23075
HANLEY, G. M. N81-23595
N81-23599
HANOLD, R. J. N81-23701
HANSEN, T. N81-23521
HANSEN, W. L. N81-23790
HANSON, A. L. N81-23228
HANTMAN, R. G. N81-23091
N81-23092
HARLAN, J. C. N81-23544
HARLING, O. K. N81-23914
HARNISCHMACHER, E. N81-23539
HARPER, J. R. N81-23393
N81-23394
HARRIS, C. D. N81-23036
HARRIS, D. B. N81-23837
HARRIS, I. N81-23987
N81-23990
HARRIS, J. S., JR. N81-23660
HARRIS, K. L. N81-23568
HARRIS, R. L., SR. N81-23791
HARRISON, T. D. N81-23675
HARRISON, W. W. N81-23911
HARSCH, H. N81-23009
HARSHA, P. T. N81-23411
HARTL, P. N81-23137
HARTMAN, R. A. N81-23019
HARTMANN, H. N81-23152
HARTWELL, T. N81-23729
HARVEY, D. J. N81-23259
HARVEY, G. N81-23737
HASKO, S. N81-23445
HAYES, T. P. N81-23678
HAYNES, B. W. N81-23323
HEFT, R. C. N81-23603
HEGEDUS, C. R. N81-23268
HEGG, D. R. N81-23183
HEHEMANN, R. F. N81-23256
HEINBOCKEL, J. H. N81-23926
HELLER, A. N81-23596
HELLERMANN, E. N81-23969
HELLWEG, J. N81-23163
HENDRICKS, R. C. N81-23417
N81-23418

HENGQIN, Z. N81-23136
HENINS, I. N81-23917
HENNIG, H. N81-23073
HENRIKSEN, K. N81-23533
HENRY, J. L. N81-23217
HENTRICH, T. N81-23113
HERLACHER, T. L. N81-23656
HERMANN, A. M. N81-23626
HERR, M. H. N81-23114
HERRIN, J. R. N81-23073
HERTZBERG, M. N81-23233
HESS, P. N81-23969
HICKEY, J. S. N81-23763
HICKS, E. N81-23596
HILDEBRANDT, F. N81-23022
HILDENBRAND, D. L. N81-23210
HILL, H. S. N81-23853
HILL, L. G. N81-23722
HINDES, D. K. N81-23325
HINKLEY, E. D. N81-23742
HINSON, E. W. N81-23181
HINTEREGGER, H. E. N81-23508
HIRST, E. N81-23686
HIRVONEN, J. K. N81-23466
HITT, E. F. N81-23477
HITTLE, D. C. N81-23326
HOBBS, C. H. N81-23718
HOCK, J. C. N81-23688
HODGE, D. B. N81-23739
N81-23740
HODGSON, V. R. N81-23789
HOFFMAN, H. N81-23023
HOFFMAN, M. A. N81-23919
HOIDA, H. W. N81-23917
HOLCOMBE, C. E., JR. N81-23190
N81-23191
HOLLAND, R. M., JR. N81-23717
HOLLE, R. L. N81-23777
HOLLISTER, W. M. N81-23063
HOLMES, J. C. N81-23751
HOLT, O. N81-23521
HOMANN, P. S. N81-23717
HOMENY, J. N81-23479
HONG, C. M. N81-23273
HOOPER, M. N81-23600
HOOVER, E. R. N81-23687
HOPEWELL, W. D. N81-23212
HOPKINS, R. H. N81-23613
HORNE, A. J. N81-23553
HORNER, M. W. N81-23473
HORST, R. L. N81-23795
HORTON, G. J. N81-23060
HOUDEVILLE, R. N81-23048
HOUSE, P. W. N81-23688
HOUSTON, R. L. N81-23406
HOUWINK, R. N81-23050
HOW, K. T. S. N81-23983
HOWARD, J. E. N81-23351
HOWARD, J. L. N81-23946
HOWARD, P. L. N81-23460
N81-23468
HOWELL, W. C. N81-23792
HSI, S. N81-23317
HSIAO, P. N81-23843
HSU, L. C. N81-23205
HUANG, F. N81-23534
HUB, K. N81-23692
HUBLER, G. K. N81-23466
HUDSON, J. B. N81-23224
HUDSON, S. L. N81-23636
HUEBNER, A. W. N81-23656
HUECK, H. N81-23945
HUFEN, T. H. N81-23577
HUFFAKER, R. M. N81-23781
HUFFSTETLER, J. N81-23727
HUGHES, P. S. N81-23598
HUGHES, R. D. N81-24018
HULL, D. G. N81-23178
HUMPHREY, J. A. C. N81-23421
HUNEYCUTT, B. N81-23562
HUNG, R. J. N81-23760
HUNSINGER, B. J. N81-23386
HUNT, B. R. N81-23566
HURRASS, K. N81-23021
HUTCHISON, K. N81-23770
HYMAN, D. H. N81-23921

I

I, L. N81-23413
IBERALL, A. S. N81-23506
IMMARIGEON, J. P. A. N81-23088
ISSLER, R. N81-23110
ITOH, T. N81-23388

J

JACKSON, M. E. N81-23200
JACKSON, S. V. N81-23685
JACQMIN, N. E. N81-23817
JAEGER, H. N81-23652
JAHRIES, E. N81-23109
JAKOVCEVIC, A. N81-23623
JARBOE, T. R. N81-23917
JARRELL, J. P. N81-23785
JASPERSON, W. H. N81-23773
JAVELLE, J. N81-23048
JENKINS, D. N81-23714
JENKINS, J. M. N81-23067
JENKINS, W. K. N81-23365
JERINA, K. L. N81-23195
JESSUP, E. S. N81-23298
JEWELL, N. P. N81-23844
JIN, J. I. N81-23290
JINAN, S. N81-23136
JINXIANG, C. N81-23136
JOHN, S. B. P. N81-23328
JOHNSON, B. N81-23641
JOHNSON, J. A. N81-23865
JOHNSON, J. A., III N81-23413
JOHNSON, K. J. N81-23870
JOHNSON, P. M. N81-23225
JOHNSON, R. B. N81-23438
JOHNSON, R. E. N81-23632
JOHNSON, R. H. N81-23876
JOHNSON, R. P. N81-23870
JOHNSON, R. W. N81-23384
N81-23749
JOHNSON, T. W. N81-23339
JOHNSON, W. N81-23813
JOHNSON, W. C. N81-23238
JOHNSTON, D. W. H. N81-24015
JONES, A. D. N81-23474
JONES, K. W. N81-23228
JONES, R. N81-23024
JONES, T. B. N81-23521
N81-23535
N81-23540
JORDAN, C. E. N81-23581
JOSEPHSON, P. D. N81-23097
JOST, G. S. N81-23249
JOY, P. N81-23671
N81-23672
N81-23673
N81-23674
JOYCE, G. T. N81-23030
N81-23031
N81-23032
N81-23033
JUNG, J. N81-23907
JUNZHANG, J. N81-23124

K

KADUSHIN, I. N81-23093
KAELBLE, D. H. N81-23619
KAISER, B. D. N81-23636
KALBE, H. N81-23022
KALE, P. P. N81-23168
KALFAYAN, S. H. N81-23300
KALTER, R. J. N81-23322
KAMIN, R. A. N81-23199
KANE, D. C. N81-23629
KANGLIN, J. N81-23115
KAPLAN, R. S. N81-23264
KAREL, M. N81-23800
KARTERIS, M. A. N81-23545
KATOW, M. S. N81-24013
KATZ, J. N81-23039
KAUL, R. K. N81-23496
KELLAR, R. J. N81-23781
KENDIG, M. N81-23619
KENNEDY, P. N81-23289
KENNEDY, R. M. N81-23426
KENNEDY, R. S. N81-23366
KENT, J. T. N81-23846
KENT, S. N81-23184
KEPHART, R. D. N81-23443
KERKAR, S. P. N81-23792
KERTH, L. T. N81-23870
KETCHUM, J. W. N81-23368
KHALAFALLA, S. E. N81-23299
KHALIL, Z. S. N81-23832
KHARTIRZAD, B. N81-23810
KHURGIN, J. N81-23451
KIKUCHI, R. N81-23349
KIM, C. S. N81-23291
KIM, T. J. N81-23377
KING, J. M. N81-23651
KING, M. J. N81-23725
KING, R. L. N81-23592
KINGSMILL, B. A. N81-23962
KIPP, E. R. N81-23547
N81-23548
KIRKPATRICK, A. R. N81-23401
KLEIN, D. E. N81-23571
N81-23572
KLEIN, S. A. N81-23714
KLEINSCHMIDT, P. D. N81-23210
KLOSTER, M. N81-23014
KNAPP, L. J. N81-24002
KNASEL, T. M. N81-23617
KNIGHT, S. N81-23596
KOBAYASHI, A. S. N81-23495
KOCH, R. K. N81-23475
KODITSCHEK, D. E. N81-23831
KOEGEBOEHN, L. P. N81-23069
KOERNER, H. N81-23431
KOHL, F. J. N81-23243
KOHL, H. N81-23511
KOLBE, W. F. N81-23726
KOMAREK, T. A. N81-24006
KOPKA, H. N81-23521
KOPP, J. W. N81-23593
KORKOTSIDES, A. S. N81-23852
N81-23855
KORREL, J. A. N81-23781
KORWAR, V. N. N81-24007
KOSCHEL, W. N81-23010
KOSTIUK, T. N81-23448
KOTANSKY, D. R. N81-23026
KOTHANDARAMAN, G. N81-23312
KOVACEVIC, A. E. N81-23943
KOVACH, L. N81-23190
N81-23191
KOZUBAL, A. J. N81-23823
KRAMER, F. N81-23093
KRANER, H. W. N81-23228
KRAUTER, A. I. N81-23464
KRIEGER, H. N81-23547
N81-23548
KRIJN, R. N81-23020
KRON, N., JR. N81-23699
KRUPKA, M. C. N81-23685
KUHLMAN, G. N81-23466
KUMAR, M. N81-23302
KUMAR, P. N81-23116
KUNKEL, K. E. N81-23440
KUNKEL, R. G. N81-23471
N81-23472
KUNZ, W. N81-23956
KUO, J. T. N81-23091
N81-23092
KUO, K. K. N81-23302
KUPPERMAN, D. S. N81-23292
KWAN, B. W. N81-23740

L

LABELL, R. W. N81-23068
LAGALLY, M. G. N81-23209
N81-23927
LAHUANI, J. N81-23923
LAI, W. N81-23444
LALUMIA, T. M. N81-23376
LAMOREAUX, R. H. N81-23210
LAMPE, R. F. N81-23598
LAND, C. E. N81-23437
LAND, J. E. N81-23975
LANG, R. N81-23131
LANK, G. W. N81-23351
LARSON, A. N81-23442
LARSON, D. L. N81-23705
LARSON, R. W. N81-23565

LASLETT, L. J. N81-23910
LAU, K. H. N81-23210
LAU, L. S. N81-23983
LAUNDER, B. E. N81-23421
LAVID, M. N81-23208
LAW, S. L. N81-23323
LAWRENCE, D. M. N81-23768
LAWRENCE, T. R. N81-23781
LEAMER, R. W. N81-23543
LEANG, C. N81-23562
LEAVITT, K. N81-23784
LEBALLEUR, J. C. N81-23051
LEDFORD, E. B., JR. N81-23201
LEE, B. S. N81-23239
LEE, C. N81-23497
LEE, C. R. N81-23559
N81-23560
LEE, C. S. N81-23496
LEE, D. N81-23426
LEE, E. P. N81-23885
LEE, J. N81-23373
LEE, K. D. N81-23318
LEE, L. C. N81-23867
LEE, M. J. N81-23405
LEE, P. N81-23904
N81-24010
LEE, P. J. N81-24007
LEE, S. S. N81-23554
N81-23555
N81-23556
N81-23557
N81-23558
N81-23559
N81-23560
LEE, S. W. N81-23390
LEFRANC, O. N81-23153
LEGENDRE, P. N81-23147
LEGUYT, J. C. N81-23119
LENTZEN, D. N81-23729
LENZ, R. W. N81-23290
LERNER, R. G. N81-23944
LESKOVAR, B. N81-23726
LETICO, E. N81-23144
LEUNG, C. N81-23619
LEVINE, E. N81-23692
LEVINE, H. N81-23343
N81-23488
N81-23861
LEVY, A. N81-23255
LEWIS, P. F. N81-23219
LHONNEN, J. Y. N81-23140
LI, S. S. N81-23378
LI, Y. N81-23413
LIAW, M. N81-23930
LIDDIARD, T. P. N81-23305
LIEPELT, U. N81-23759
LIER, H. P. N81-23120
LIHUA, W. N81-23164
LIN, C. N81-23707
LIN, C. S. N81-23751
LIN, C. W. N81-23402
LIN, J. G. N81-23183
LIN, S. Y. N81-23369
LINDBERG, J. D. N81-23772
LINDSAY, R. W. N81-23786
LINFORD, R. K. N81-23917
LING, R. F. N81-23853
N81-23854
LIOU, K. N. N81-23770
LIS, S. N81-23659
LIU, H. K. N81-23439
LIVINGSTON, P. M. N81-23454
LIVNI, T. N81-23247
LLANER, J. N81-23790
LO, Y. V. N81-24003
LOCKWOOD, M. N81-23537
LOEB, G. I. N81-23280
N81-23787
LOEWENSTEIN, W. B. N81-23397
LOGEE, T. N81-23647
LOH, P. C. S. N81-23983
LOKEN, S. C. N81-23870
LOMBARD, D. N81-23117
LOMBARD, M. D. N81-23114
LONGSU, W. N81-23124
LORBER, P. F. N81-23042
LORCH, G. N81-23142
LOTTERO, R. E. N81-23423
LOTZ, H. J. N81-23521
LOU, D. J. N81-23785
LOU, Y. K. N81-23430
LOUBSKY, W. J. N81-23611
LOUIS, J. F. N81-23611
LOWELL, C. E. N81-23245
LOWRY, R. T. N81-23565
LU, C. H. N81-23337
LU, C. L. N81-23611
LUCCHESI, M. A. N81-23098
LUCIER, B. J. N81-23227
LUDWIG, F. L. N81-23730
LUMLEY, J. L. N81-23038
LUMMUS, J. R. N81-23030
N81-23031
N81-23032
N81-23033
LUTENEGGER, D. J. N81-23722
LYDEN, J. D. N81-23565
LYNCH, N. A. N81-23381

M

MAASBERG, J. N81-23255
MABEY, D. G. N81-23056
MACCALLUM, R. N. N81-23586
MACH, W. N81-23015
MACK, E. J. N81-23778
MACLENNAN, J. R. N81-23097
MADON, P. N81-23105
MAGYAR, M. J. N81-23264
MAHAN, W. M. N81-23267
MAHER, F. N81-23325
MAKAR, H. V. N81-23264
MALARKEY, A. T. N81-23982
MALINOWSKI, R. L. N81-23617
MALL, S. N81-23495
MALONE, M. J. N81-23681
MANASEVIT, H. M. N81-23632
MANSFELD, F. B. N81-23619
MANSON, S. S. N81-23491
MARASCHIN, R. A. N81-23623
MARK, J. E. N81-23284
MARK, J. W. K. N81-23920
MARKHAM, R. N81-23347
MARKIEWIC, T. W. N81-23870
MARKUS, S. N81-23484
MARLE, T. L. N81-23689
N81-23690
N81-23691
MARSDEN, J. E. N81-23828
N81-23834
MARSHALL, J. N81-23917
MARTINKO, E. A. N81-23547
N81-23548
MARU, H. N81-23600
MASSIMO, F. M. N81-23860
MASTANAIAH, K. N81-23409
MATHENY, R. W. N81-23688
MATSUO, R. M. N81-23073
MATSUSHITA, M. T. N81-23623
MATTAS, R. F. N81-23907
MATTHAEUS, W. H. N81-23900
MATTHEWS, M. M. N81-23678
MAY, M. E. N81-23304
MAYR, H. G. N81-23987
N81-23990
MAZHAR, Z. N81-23427
MCAFEE, N. N81-23727
MCCAFFEY, R. W. N81-23899
MCCLELLAN, R. O. N81-23719
MCCLOY, T. M. N81-23794
MCCOLL, M. N81-23385
MCCOLLOM, M. N81-23596
MCCOLLOUGH, D. H. N81-23899
MCCONACHIE, W. N81-23577
MCCORKLE, D. L. N81-23875
MCDONALD, G. N81-23417
N81-23418
MCDONALD, H. O. N81-23263
MCINTYRE, F. L. N81-23303
MCKENNA, K. F. N81-23917
MCKINLEY, R. L. N81-23858
MCKINNEY, R. P. N81-24000
MCLEESTER, J. N. N81-23588
MCMANUS, B. L. N81-23064
MCMILLAN, O. J. N81-23027
MCMULLIN, P. R. N81-23809
MCNEILL, B. W. N81-23379
MCNELLEY, T. R. N81-23494
MCNULTY, K. J. N81-23982
MCNULTY, P. J. N81-23869
MCVEIGH, M. A. N81-23064
MEAGHER, G. M. N81-23184
MEAKIN, J. D. N81-23661
MEEKER, J. G. N81-24006
MEEKS, H. J. N81-23060
MEIXIAO, Y. N81-23133
MENDENHALL, M. R. N81-23029
MENDILLO, M. N81-23522
MENZEL, R. N81-23108
MESSMER, R. P. N81-23296
MESSNER, W. N81-23148
MEYER, S. N81-23188
MEYERS, P. D. N81-23870
MICHELS, T. I. N81-23630
MICK, C. K. N81-23944
MIERS, B. T. N81-23771
MIHALOEW, J. R. N81-23085
MILEY, G. H. N81-23918
MILLER, D. A. N81-23202
MILLER, D. L. N81-23660
MILLER, K. L. N81-23530
MILLER, R. B. N81-24006
MILLER, R. L. N81-23901
N81-24012
N81-24014
MINDLIN, H. N81-23945
MINER, R. V. N81-23244
MINGJUN, H. N81-23133
MINK, J. W. N81-23383
MISRA, B. N81-23611
N81-23907
MISSAL, D. N81-23647
MITCHELL, C. M. N81-23942
MITCHELL, J. R. N81-23453
MITCHELL, P. N81-23671
N81-23672
N81-23673
N81-23674
MIXON, R. W. N81-23791
MOERNER, W. E. N81-23447
MOLLENKOPF, H. C. N81-23613
MONSON, R. N81-23919
MONTICELLO, D. A. N81-23913
MOORE, B. J. N81-23582
MOORE, R. T. N81-23372
MOOSE, R. A. N81-23893
MOOZ, W. E. N81-23735
N81-23736
MORGAN, J. R. N81-23212
MORRIS, D. H. N81-23193
MORRISON, W. G., JR. N81-23863
MOSES, R. W., JR. N81-23918
MOSIER, S. A. N81-23073
MOSS, D. G. N81-23059
MOUDY, L. A. N81-23632
MOULDER, G. R. N81-23460
N81-23468
MOWFORTH, K. N81-23540
MUIRHEAD, V. U. N81-23040
N81-23174
MULLER, J. N81-23103
MUMMA, M. N81-23448
MUNSON, H. E. N81-23466
MUNZ, D. N81-23505
MURALIDHARAN, U. N81-23491
MURPHY, A. C. N81-23072
MURPHY, L. M. N81-23501
N81-23502
MURRAY, T. J. N81-23695
MURRAY, W. N81-23630
MURRI, W. J. N81-23278
MYERS, L. M. N81-23819

N

NAGEL, D. J. N81-23904
NAGLER, R. G. N81-23100
NAGY, E. J. N81-23487
NAMKEN, L. N. N81-23543
NANASI, T. N81-23484
NARAYANAN, K. N81-23138
NARENDRA, K. S. N81-23824
N81-23831
NARENDRA, P. M. N81-23890
NATAUPSKY, M. N81-23794
NATUSCH, D. F. S. N81-23257
NEATHAMMER, R. D. N81-23949
NEBEL, R. A. N81-23918

NEEDHAM, P. B., JR. N81-23266
N81-23270
NEELY, M. N81-23704
NEGUS-DEWYS, J. N81-23318
NEIHOF, R. A. N81-23304
NEILL, J. M. N81-23638
NELSON, G. R. N81-23807
NELSON, M. R. N81-23948
NESKE, E. N81-23512
NETZER, D. W. N81-23715
NEWMAN, A. L. N81-23741
NEWSOM, D. N81-23692
NEWTON, R. R. N81-23988
NICOLET, M. N81-23525
NIELL, A. E. N81-23998
NISBET, J. S. N81-23538
NITSCHE, W. N81-23412
NIX, J. R. N81-23883
NIXON, P. R. N81-23543
NORMAN, G. T. N81-23634
NORTON, T. N81-23960
NWADIKE, E. V. N81-23555
N81-23556
N81-23557
N81-23558
NYBERG, E. D. N81-23285

O

OAKLEY, S. A. N81-23228
OBERHOLTZER, J. D. N81-23996
OBERLE, R. D. N81-23314
OBRIEN, C. J. N81-23185
N81-23186
OBRIEN, J. O. N81-23184
OBRIEN, W. L. N81-23268
OCONNELL, L. G. N81-23980
N81-23981
ODEN, L. L. N81-23217
OHLSON, J. E. N81-23360
N81-23362
N81-23363
OKIISHI, T. H. N81-23090
OKOLOWITZ, P. N01-23107
OKORIE, B. A. N81-23235
OMALLEY, C. D. N81-23030
N81-23031
N81-23032
N81-23033
ORBACH, R. N81-23212
OREAR, D. J. N81-23311
ORIANI, R. A. N81-23294
ORSZAG, S. A. N81-23414
OSEN, O. N81-23132
OTVOS, J. W. N81-23220
N81-23222
N81-23223

P

PAHLMAN, J. E. N81-23299
PALMER, A. N81-23735
PALMER, J. D. N81-23169
PALMER, R. E. N81-23043
PALSULE, S. S. N81-23138
PAN, C. H. T. N81-23464
PANG, S. N81-23562
PANICKER, P. N81-23138
PAPAS, C. H. N81-23356
PARK, M. K. N81-23194
PARKER, C. N81-23729
PARKER, D. G. N81-23334
PARKER, J. C. N81-23604
PARKER, J. D. N81-23696
PARKER, R. J. N81-23462
PARKER, W. G. N81-23681
PARR, J. E. N81-23076
PASQUINELLI, G. N81-23144
PASTIRIK, E. N81-23612
PAULISCH, R. N81-23759
PAYNE, B. W. N81-23052
PEACOCK, A. T. N81-23073
PEAKE, D. J. N81-23037
PEARSON, M. J. N81-23733
PEARSON, R. K. N81-23183
PEASE, C. H. N81-23786
PEERCY, P. S. N81-23437
PELLERIN, R. A. N81-23322
PENNICK, H. G. N81-23469
PERCIVAL, C. D. N81-23393
N81-23394
PERKINS, S. C., JR. N81-23029
PESCHON, J. N81-23643
N81-23978
PETERS, D. B. N81-23354
N81-23355
PETERSON, A. A. N81-23070
PETERSON, B. B. N81-23824
PETERSON, J. A. N81-23256
PETROSIAN, V. N81-23868
PETROSKI, R. R. N81-23567
PFEIFFER, W. W. N81-23901
PFERDEHIRT, W. N81-23699
PHAMTAT, D. N81-23171
PHELPS, A. V. N81-23449
PHILIPSON, W. R. N81-23588
PHILLIPS, B. N81-23610
PICAUD, M. N81-23160
PIERRE, J. F. N81-23620
PIHOS, G. G. N81-23762
PITCHFORD, M. N81-23733
PLANKEY, B. N81-24017
PLATTS, D. A. N81-23917
PLUMMER, E. W. N81-23276
POCALUJKA, L. P. N81-23779
POEVERLEIN, H. N81-23512
POIRIER, D. R. N81-23250
POISSON-QUINTON, P. N81-23094
POMEROY, L. R. N81-23728
PONS, B. S. N81-23833
POOLOS, N. P. N81-23417
POPOT, M. N81-23167
PORACSKY, J. N81-23547
N81-23548
POST, M. J. N81-23781
POUZET, A. N81-23170
PRABHAKARAN, R. N81-23492
PRATT-BARLOW, C. R. N81-23071
PRATT, J. W. N81-23854
PRENTICE, M. J. N81-23848
PRICE, P. N81-23303
PRIESTLEY, J. T. N81-23781
PROAKIS, J. G. N81-23368
PROELSS, G. W. N81-23528
PRON, A. B. N81-23274
PRUIKSMA, R. T. N81-23203
PRYOR, R. A. N81-23615
PRYSOCK, R. H. N81-23328
PRZYSTUPA, M. A. N81-23241
PULIDO, C. N81-23957
PURI, N. L. N81-23857

Q

QIANLI, Y. N81-23112
QINGLIN, L. N81-23123
QUINN, F. H., ... N81-23780
QUINN, T. H. N81-23735
N81-23736

R

RACK, H. J. N81-23260
RAICHOUDHURY, P. N81-23613
RAINE, H. R. N81-23145
RAITBY, G. D. N81-23427
RAITT, W. J. N81-23514
RAMAIAN, R. N81-23413
RAMBILAS, T. N81-23130
RAMEY, D. A. N81-23340
RAMKUMAR, R. L. N81-23192
RAMULU, M. N81-23495
RANEY, D. C. N81-23785
RANQUET, J. N81-23128
RAO, A. M. N81-23322
RAO, A. V. N81-23729
RAO, S. B. N81-23459
RAUH, R. D. N81-23214
RAUTENBERG, R. E. N81-23820
RAWAL, M. L. N81-23168
RAWER, K. N81-23539
REBBECHI, B. N81-23077
REBER, C. A. N81-23534
RECKASE, M. D. N81-23858
REDDY, C. S. N81-23034
REDDY, N. N. N81-23028
REECE, E. W. N81-23756
REED, I. S. N81-24014
REICHMAN, J. N81-23676
REIFF, G. N81-23641
REILLY, J. N81-23642
REIN, R. L. N81-23947
REINHARDT, C. L. N81-23689
N81-23690
N81-23691
REISER, C. A. N81-23651
RENARD, J. P. N81-23141
RENZETTI, N. A. N81-23997
RETALLICK, F. D. N81-23611
RICHARDS, P. G. N81-23523
RICHARDSON, A. J. N81-23543
RICKARD, E. N81-23896
RIDGWAY, W. L. N81-23893
RIEDER, P. F. N81-23059
RIGGS, G. E. N81-23628
RIHACZEK, A. W. N81-23351
RILIE, R. J. N81-23778
RITTBERGER, W. N81-23959
RIVLIN, R. S. N81-23499
N81-23500
RIZZETTA, D. P. N81-23047
ROBERT, J. M. N81-23148
ROBERTS, J. B. N81-23485
ROBERTS, W. E. N81-23709
ROBINSON, A. C. N81-23477
ROBINSON, F. N81-23013
ROBINSON, T. N81-23521
ROBLE, R. N81-23527
ROETTGER, J. N81-23531
ROGERS, C. W. N81-23778
ROGERS, M. A. N81-23819
ROHATGI, A. N81-23613
ROSE, R. S. N81-23470
ROSEMEIER, R. G. N81-23480
ROSEN, A. N81-23247
ROSEN, M. N81-23271
ROSENBERG, T. J. N81-23754
ROSENTHAL, W. D. N81-23544
ROSNER, D. E. N81-23243
ROSS, D. A. N81-23946
ROWLETTE, J. J. N81-23602
ROY, A. N81-23256
RUBEN, H. D. N81-23017
RUBENSTEIN, L. D. N81-23975
RUDMAN, S. N81-23419
RUHLIN, C. L. N81-23071
N81-23072
RUHOU, Z. N81-23133
RUOTSALA, J. N81-23318
RUSIN, J. M. N81-23882
RUSSAK, M. A. N81-23676
RUSSELL, J. H. N81-23217
RUTH, R. P. N81-23632
RYERSON, D. E. N81-23756

S

SAATCIOGLU, M. N81-23329
SADANANDA, K. N81-23248
SADOWSKI, E. P. N81-23254
SAGE, A. P. N81-23849
N81-23940
N81-23941
SAGER, E. V. N81-23100
SALKELD, R. N81-23185
SALLOMAN, E. B. N81-23904
SALO, S. A. N81-23786
SAMSA, M. N81-23692
SANDHOLT, P. E. N81-23533
SANDRI, G. N81-23425
SANTIGO, J. P. N81-23413
SAPORTA, L. N81-23345
N81-23346
SARICKS, C. L. N81-23722
SARTWELL, B. D. N81-23266
N81-23270
SATAGOPAN, S. N81-23121
SATKIEWICZ, F. G. N81-23648
SATTERFIELD, C. N. N81-23317
SATYANARAYANA, A. N81-23832
SAUNDERS, M. A. N81-23830
SAVAGE, W. F. N81-23261
SAWYERS, K. N. N81-23500
SAXENA, K. M. L. N81-23851
SCARPACE, F. L. N81-23542

SCHACHER, G. E. N81-23752
SCHAEFER, A. O. N81-23253
SCHAPERY, R. A. N81-23195
SCHARF, W. D. N81-23892
SCHAUDE, G. N81-23969
SCHEFFE, M. N81-23350
SCHENKEL, F. W. N81-23446
SCHICK, I. C. N81-23859
SCHLESINGER, Z. N81-23888
SCHMIDT, E. N81-23148
SCHMIDTKE, G. N81-23509
SCHMITT, J. A. N81-23423
SCHMUTZ, L. N81-23391
SCHNACKE, A. W. N81-23694
SCHNEIDER, A. R. N81-23637
SCHNEIDER, K. N81-23106
SCHNEIDER, L. W. N81-23804
SCHNEIDER, W. N81-23969
SCHNETZLER, C. C. N81-23175
SCHONE, C. L. N81-23362
SCHRODT, J. T. N81-23716
SCHUNK, R. W. N81-23514
SCHUTTER, K. J. N81-23058
SCHWENK, J. C. N81-23081
SCIAMMARELLA, C. N81-23292
SCOTT, M. J. N81-23725
SEARCY, J. Q. N81-23399
SEARS, W. E., III N81-23793
SEAVER, D. A. N81-23839
SEBASTIEN, P. N81-23731
SEECK, G. N81-23149
SEEGER, P. A. N81-23442
SEEGER, W. N81-23157
SEINFELD, J. H. N81-23742
SEIPP, E. N81-23652
SENGUPTA, S. N81-23554
N81-23555
N81-23556
N81-23557
N81-23558
N81-23559
N81-23560
SERREZE, H. B. N81-23641
N81-23659
SESHAN, R. N81-23118
SESSOMS, A. L. N81-23443
SETH, A. K. N81-23116
N81-23130
SETTLES, G. S. N81-23415
SEWALL, W. G. N81-23096
SHACKELFORD, J. F. N81-23504
SHAFFER, R. D. N81-23998
SHAHINIAN, P. N81-23248
SHAMROTH, S. J. N81-23053
SHANTHIKUMAR, J. G. N81-23806
SHAO, M. N81-23391
SHAPIRO, S. L. N81-23898
SHARP, R. D. N81-23513
SHAW, H. N81-23671
N81-23672
N81-23673
N81-23674
SHAW, R. P. N81-23748
SHEIBLEY, D. W. N81-23205
SHELAR, E. N81-23730
SHELLEY, E. G. N81-23513
SHEPHERD, G. G. N81-23743
SHEPHERD, H. D. N81-23891
SHEPHERD, J. G. N81-23783
SHEPHERD, K. P. N81-23712
SHERIDAN, W. T. N81-23984
SHERWOOD, A. R. N81-23917
SHEWMON, P. G. N81-23258
SHIPMAN, J. R. N81-23764
SHOEMAKER, R. L. N81-23207
SHORE, B. W. N81-23879
SHORE, J. E. N81-23384
SHOWERS, R. M. N81-23369
SHUBERT, K. A. N81-23341
SHUCHMAN, R. A. N81-23565
SHUK-YU LI, P. N81-23398
SHULL, R. D. N81-23688
SIEGEL, A. I. N81-23801
SIEGMUND, D. N81-23842
SIERK, A. J. N81-23883
SIETH, H. H. N81-23058
SIEVERS, A. J. N81-23447
N81-23888
N81-23929
SILVA, F. N81-23813
SILVER, R. N. N81-23442
SIMISTER, B. W. N81-23324
SIMMONS, C. S. N81-23428
SIMON, K. N81-23131
SIMON, R. L. N81-23634
SIMONS, G. A. N81-23312
SIMS, R. A. N81-23586
SIMS, R. L. N81-23066
SINCLAIR, A. R. N81-23701
SINGER, I. N81-23466
SINGH, M. K. N81-23722
SINHA, S. K. N81-23557
N81-23558
SIPERKO, C. M. N81-23347
SIRIWARDANE, R. N81-23489
SISKIND, D. E. N81-23593
SITTHIPHONG, N. N81-23407
SIVJEE, G. G. N81-23533
SKEWES-COX, A. O. N81-23695
SLATER, M. H. N81-23310
SLAWSON, P. R. N81-23427
SLEMROD, M. N81-23828
SLOBIN, S. N81-24008
SMITH, C. N81-23900
SMITH, D. L. N81-23907
SMITH, K. E. N81-23064
SMITH, L. N81-23910
SMITH, L. G. N81-23526
N81-23530
SMITH, M. C. N81-23025
SMITH, N. N81-23280
SMITH, R. L. N81-23464
SMITH, W. H. N81-23870
SNELLING, R. N. N81-23733
SNIDER, J. J. N81-23073
SNOW, G. C. N81-23215
SOBOROFF, D. M. N81-23263
SOFFER, B. H. N81-23349
SOJKA, J. J. N81-23514
SOLOMON, A. A. N81-23293
SOMORJAI, G. A. N81-23230
SOPER, A. N81-23442
SOSA, E. N. N81-24004
SPENCER, R. R. N81-23884
SPEYER, J. L. N81-23178
SPIRONELLO, V. R. N81-23267
SPITLER, M. T. N81-23213
SPRADLIN, L. W. N81-23694
SPRIGGS, D. R. N81-23091
N81-23092
SPROTT, J. C. N81-23903
SQUILLANTE, M. N81-23659
SRIRAM, K. N81-23806
SRIRANGAN, T. V. N81-23102
STACHIW, J. D. N81-23897
STACHURA, V. J. N81-23593
STAFFANSON, F. L. N81-23766
STAGG, M. S. N81-23593
STALEY, H. G. N81-23638
STALLINGS, L. N81-23289
STANTON, E. E., III N81-23807
STAPLETON, B. P. N81-23059
STEARNS, C. A. N81-23243
STECKER, F. W. N81-23986
STEEGER, E. J. N81-23638
STEELE, R. S., JR. N81-23697
STEENHOEK, L. E. N81-23871
STEHLE, C. G. N81-23538
STEINBERG, B. D. N81-23359
STEINBERG, F. S. N81-23179
STEINHAVER, R. A. N81-23434
STELLA, M. N81-23611
STELZRIED, C. N81-24008
STENGER, A. J. N81-23895
STENTZ, R. H. N81-23246
STEPHENS, M. A. N81-23841
STERN, D. P. N81-23992
STERNFELD, H., JR. N81-23864
STERNLIEB, A. N81-23910
STEVENS, H. C. N81-23907
STEVENSON, W. H. N81-23420
STEWART, R. W. N81-23742
STONE, W. R. N81-23895
STRAETMANS, W. N81-23159
STRAIT, E. J. N81-23903
STRAUSS, H. R. N81-23913
STROMBERG, W. J. N81-23086
STRONG, A. B. N81-23427
STROUD, R. D. N81-23504
STROVINK, M. N81-23870
STRUNCE, R. R. N81-23183
STRUNK, H. N81-23618
STUBBE, P. N81-23521
STUEHLEN, B. N81-23015
SU, T. C. N81-23430
SUBELMAN, E. J. N81-24011
SUEVERKRUEBBE, R. N81-23171
SULLIVAN, G. V. N81-23581
SULLIVAN, R. F. N81-23311
SULYMA, P. R. N81-23187
SUMMERS, R. L. N81-23435
SUMMERS, W. A. N81-23620
SUN, Y. K. N81-23748
SUTTON, B. J. N81-23697
SWAMINATHAN, D. N81-23118
SWANSON, C. A. N81-23968
SWARTZ, C. K. N81-23626
N81-23627
SWEENEY, D. W. N81-23912
SWINNEY, M. N81-23751
SZUSZCZEWICZ, E. P. N81-23751

T

TAGAYA, Y. N81-23158
TAHILIANI, V. H. N81-23396
TAKAHASHI, R. K. N81-23919
TAKEMURA, A. N81-23840
TANGCHITIVITTAYA, C. N81-23240
TANZMAN, E. N81-23692
TARPLEY, W. B., JR. N81-23460
N81-23468
TAULBEE, D. B. N81-23038
TAUSWORTHE, R. C. N81-23814
TAYLOR, D. R. N81-23257
TEARE, J. D. N81-23611
TEMPLE, E. C. N81-23764
TERRELL, G. R. N81-23812
THIBEAULT, P. R. N81-23308
THIEL, R. N81-23652
THIEMANN, H. N81-23529
THIGPEN, L. N81-23757
THOMAS, C. E., JR. N81-23905
THOMAS, J. B. N81-23344
THOMAS, J. M. N81-23252
THOMAS, R. N81-23156
THOMPSON, A. D. N81-23059
THOMPSON, G. L. N81-23313
THOMPSON, H. D. N81-23420
THOMPSON, T. R. N81-23100
THORNTON, J. A. N81-23661
THORNTON, S. I. N81-23334
THRANE, E. V. N81-23515
TIBBOTT, R. L. N81-23335
TIRMAN, V. W. N81-23794
TOBAK, M. N81-23037
TOBIAS, R. H. N81-23283
TODREAS, N. E. N81-23703
TOENSKOETTER, H. N81-23011
TONG, H. N81-23215
TONGISH, C. A. N81-23587
TONGLI, Y. N81-23115
N81-23123
TORKELSON, L. N81-23705
TORQUATO, S. N81-23408
TORR, D. G. N81-23523
N81-23527
TORR, M. R. N81-23523
N81-23527
TRABOLD, E. L. N81-23058
TREADO, S. J. N81-23332
TRIVISONNO, R. J. N81-23625
TROFFER, L. E. N81-23363
TROIANO, A. R. N81-23256
TRUONG, T. K. N81-24014
TSE, C. S. D. N81-23204
TSUTSUI, M. N81-23286
TUANN, S. Y. N81-23559
N81-23560
TUBBS, S. J. N81-23391
TURCOTTE, R. N81-23659
TWICHELL, J. C. N81-23903
TYLER, M. C. N81-23438

U

ULRICH, P. C. N81-23465
UMPHREY, H. R. N81-23568

USHIMARU, K. N81-23395

V

VACHON, W. A. N81-23645
VANAUTRYVE, G. M. N81-23958
VANDERZIEL, A. N81-23389
VANKIRK, E. A. N81-23677
VARANASI, M. R. N81-23889
VARSHNEY, P. K. N81-23806
VEDI, S. F. N81-23963
VEINOT, D. E. N81-23087
VENDITTI, F. P. N81-23734
VERGAMINI, P. J. N81-23442
VERMILYEA, S. G. N81-23279
VETTER, O. J. N81-23701
VIEBROCK, H. J. N81-23732
VOLLAND, H. N81-23516
VORGETTES, J. N81-23585
VOSS, H. D. N81-23526
VOUROS, P. N81-23396
VYDYANATH, H. R. N81-23924
N81-23925

W

WADE, J. A. N81-23950
WAFFENSCHMIDT, E. N81-23142
WAGENER, B. N81-23370
WAINLAND, D. M. N81-23060
WALDEN, R. G. N81-23782
WALDSTEIN, S. M. N81-23816
WALEN, D. B. N81-23059
WALKER, G. A. N81-23325
N81-23937
WALKER, L. P. N81-23322
WALL, D. A. N81-23656
WALL, M. N81-23347
WALLACE, W. N81-23088
WALLENIUS, K. T. N81-23852
N81-23855
N81-23856
WALSH, W. B. N81-23722
WALTERS, M. M. N81-23043
WALTON, D. R. N81-23571
N81-23572
WALTON, J. T. N81-23790
WALTZ, R. E. N81-23901
WAMSER, C. C. N81-23220
N81-23222
N81-23223
WANG, L. L. C. N81-23916
WANG, N. N81-23353
WANG, Y. F. N81-23466
WARREN, E. H. N81-23975
WARREN, W. H., JR. N81-23984
N81-23985
WATERMAN, J. N81-23521
WATSON, A. I. N81-23777
WATSON, G. S. N81-23745
N81-23746
N81-23845
N81-23847
WATTLE, B. J. N81-23778
WEAVER, C. P. N81-23581
WEBB, B. C. N81-23888
WECHSLER, E. R. N81-24005
WEINBERG, I. N81-23626
N81-23627
WEINSTEIN, A. N81-23834
WEIR, A., JR. N81-23307
WEISS, S. J. N81-23723
WEITSMAN, Y. N81-23195
WEIZER, V. G. N81-23625
WELKIE, D. G. N81-23927
WELLS, K. D. N81-23725
WELLS, N. D. N81-23342
WELSH, W. J. N81-23284
WEN, C. Y. N81-23321
WENCK, N. C. N81-23097
WENTWORTH, M. C. N81-23633
WENZEL, W. A. N81-23870
WESTBROOK, R. M. N81-23434
WESTOVER, B. L. N81-23890
WESTOVER, D. N81-23303
WETZEL, P. N81-23647
WHEALTON, J. H. N81-23899
WHITBECK, R. F. N81-23825
N81-23826
WHITE, C. C., III N81-23849
N81-23941
WHITEHURST, D. N81-23729
WICKENS, C. D. N81-23795
WIEGAND, C. L. N81-23543
WIGHTMAN, J. P. N81-23489
WILDER, J. A., JR. N81-23297
WILKINS, D. E. N81-23805
WILKINSON, L. E. N81-23880
WILLIAMS, M. H. N81-23046
WILLIAMS, P. E. N81-23934
WILLIAMS, R. T. N81-23318
WILLSHIRE, W. L., JR. N81-23862
WILRAKER, V. F. N81-23678
WILSON, D. H. N81-23325
WILSON, D. V. N81-23964
WILSON, T. H. N81-23318
WINCZEWSKI, L. M. N81-23568
WING, W. H. N81-23207
WINICK, K. A. N81-23436
WINIECKI, A. N81-23292
WITT, J. N81-23704
WITTE, A. B. N81-23216
WOLF, K. A. N81-23735
WOLF, M. N81-23622
WOLF, R. N81-23953
WOLF, T. L. N81-23219
WOLFF, D. C. N81-23698
WOLKEN, P. R. N81-23998
WOLLENHAUPT, H. N81-23139
WOLSKO, T. N81-23692
WOMER, N. K. N81-23966
N81-23967
N81-23970
WONG, J. N81-23296
WOOD, B. L. N81-23689
N81-23690
N81-23691
WOODHEAD, P. M. J. N81-23228
WOODS, W. A. N81-23815
WOOTEN, J. W. N81-23899
WRIGHT, M. F. N81-23873
WRIGHT, M. H. N81-23830
WRIGHT, S. C. N81-23443
WU, C. N81-23562
WU, Y. C. N81-23785
WUENSCH, B. J. N81-23295
WURTELE, M. G. N81-23762
WYVILL, J. C. N81-23863

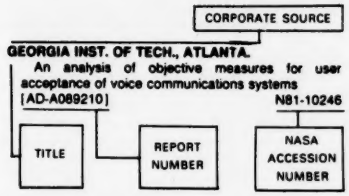
Y

YAGLE, A. E. N81-23829
YALMAN, R. G. N81-23928
YAMANE, N. I. N81-24000
YAMAYEE, Z. A. N81-23643
YAN, T. N81-24010
YANG, J. J. J. N81-23632
YARIV, A. N81-23450
YARNELL, J. N81-23442
YASUDA, A. K. N81-23623
YEH, H. Y. N81-23770
YEH, R. T. N81-23821
YEN, C. N81-23822
YORK, P. N81-23068
YOSHIHARA, H. N81-23047
YOUNG, R. H. F. N81-23983
YOUNG, S. J. N81-23753
YU, C. F. N81-23803
YU, E. N81-23739
YU, J. C. N81-23410
YUAN, P. C. N81-23724
YUH, Y. S. N81-23842
YUHAS, D. N81-23292

Z

ZADROGA, F. N81-23720
ZAK, B. D. N81-23717
ZARETSKY, E. V. N81-23462
ZAVE, P. N81-23808
N81-23821
ZEID, I. F. N81-23482
ZELINGER, S. K. N81-23722
ZELLARS, G. R. N81-23245
ZIELINSKI, P. B. N81-23585
ZIERKE, W. C. N81-23090
ZIMMERMANN, H. N81-23045
ZIPOY, D. N81-23448
ZOLESI, B. N81-23541
ZOLOMIJ, R. N81-23722
ZWICKER, W. N81-23451
ZWILLINGER, D. N81-24009

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ABCOR, INC., WILMINGTON, MASS.
Evaluation of hot acid treatment for municipal sludge conditioning
[PB81-144446] N81-23982

ACUREX CORP., MOUNTAIN VIEW, CALIF.
Catalytic combustion of coal-derived liquid fuels
[EPRI-AP-1666] N81-23215
Advanced solar concentrator: Preliminary and detailed design
[NASA-CR-164316] N81-23623
Advanced solar concentrator: Executive summary
[NASA-CR-164318] N81-23624

ADAPTIVE OPTICS ASSOCIATES, INC., CAMBRIDGE, MASS.
Advanced wavefront sensor concepts
[AD-A097187] N81-23391

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT, NEUILLY-SUR-SEINE (FRANCE).
Boundary Layer Effects on Unsteady Airloads
[AGARD-CP-296] N81-23044
Technical evaluation report on the Fluid Dynamic Panel Symposium on Subsonic/Transonic Configuration/Aerodynamics
[AGARD-AR-146] N81-23431
The physical basic of the ionosphere in the solar-terrestrial system
[AGARD-CP-295] N81-23507
Structure of electron temperature N81-23529
Information services: Their organization, control and use
[AGARD-CP-294] N81-23955

AEG-TELEFUNKEN, BACKNANG (WEST GERMANY).
Single Channel Per Carrier (SCPC)-FM system N81-23120
Highly mobile Earth stations N81-23139

AEG-TELEFUNKEN, ULM (WEST GERMANY).
The travelling wave tube TL 4003 and further development of TWT N81-23162

AEROJET LIQUID ROCKET CO., SACRAMENTO, CALIF.
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161760] N81-23184
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161759] N81-23185
Advanced oxygen-hydrocarbon rocket engine study
[NASA-CR-161748] N81-23186

AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON, INC., N. J.
Fundamental research in turbulent modeling. Part 1: Theory. Part 2: Experiment
[AD-A097431] N81-23425

AERONAUTICAL RESEARCH LABS., MELBOURNE (AUSTRALIA).
Structural design of BFRP patches for Mirage wing repair
[AD-A097195] N81-23024
An analysis of thermal balance in the cooled cabin of a Sea King Helicopter
[AD-A097199] N81-23077
Fatigue life variability in aluminum alloy aircraft structures
[AD-A097198] N81-23249
Analysis of results from an International Fatigue Test Programme
[AD-A097200] N81-23493
Coarsely random cracking in one-crack fatigue models
[AD-A097194] N81-23498

AEROSPACE CORP., EL SEGUNDO, CALIF.
A comparison of monopulse and interferometric systems
[AD-A097656] N81-23364
Extremely uniform electrodeposition of submicron Schottky contacts
[AD-A097657] N81-23385
On the structures and mapping of auroral electrostatic potentials
[NASA-CR-164336] N81-23741
Earth limb radiance transformation
[AD-A097523] N81-23753

AIR FORCE ACADEMY, COLO.
The United States Air Force Academy solar energy research project: Solar test house
[AD-A097212] N81-23628
Effects of criteria on flight simulation. Study 2: Multiple criteria
[AD-A097526] N81-23794

AIR FORCE GEOPHYSICS LAB., HANSCOM AFB, MASS.
The solar ultraviolet source for the ionosphere and its variation N81-23508
Airborne measurement of aerosol size distributions over northern Europe. Volume 1: Spring and fall 1976, summer 1977
[AD-A097090] N81-23750

AIR FORCE WRIGHT AERONAUTICAL LABS., WRIGHT-PATTERSON AFB, OHIO.
Static and dynamic evaluation of A-37 cast and cast carcass/integral tread tires
[AD-A097684] N81-23465

AKRON UNIV., OHIO.
The role of chemical bonding in adhesion
[AD-A097388] N81-23281
The role of chemical bonding in the adhesion of elastomers
[AD-A097223] N81-23282
Threshold tear strength of some molecular networks
[AD-A097232] N81-23283
Large and small deformation finite element analysis of rolling contact N81-23482

ALABAMA A & M UNIV., NORMAL.
Statistical classification techniques for engineering and climatic data samples
[NASA-CR-164337] N81-23764

ALABAMA UNIV., TUSCALOOSA.
A continuous dielectric separator for mineral beneficiation
[PB81-135014] N81-23581

ALABAMA UNIV., UNIVERSITY.
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785

ALABAMA UNIV. IN HUNTSVILLE.
Ionospsheric observation of enhanced convection-initiated gravity waves during tornadic storms
[NASA-CR-3419] N81-23760

ALASKA UNIV., FAIRBANKS.
Dynamics of the dayside cusp aurora N81-23533

ALBERTA UNIV., EDMONTON.
Polynomial approximation techniques for differential equations in electrochemical problems
[AD-A097631] N81-23833

AMERICAN INST. OF PHYSICS, NEW YORK.
Database searching and document delivery via communications satellite
[AIP-80-1] N81-23944

AMES LAB., IOWA.
Ion chromatography with low-capacity resins and low conductivity eluents
[IS-T-916] N81-23221
Hardness tests on irradiated pressure vessel steel
[IS-T-942] N81-23259
Changes occurring in coal during in situ gasification
[IS-T-950] N81-23313
Theory of flux-flow voltage noise in type II superconductors
[IS-T-935] N81-23398
Recovery and separation of products from the high-temperature chlorination of fly ash
[IS-T-947] N81-23723
Chlorination of fly ash and bentonite with a gas mixture of silicon tetrachloride and chrlorine
[IS-T-920] N81-23724
New techniques in atomic and molecular laser spectroscopy
[IS-T-936] N81-23871
Raman scattering by a molecule adsorbed at the surface of a thin metallic film
[IS-T-922] N81-23873

ANTIOCH COLL., YELLOW SPRINGS, OHIO.
Model systems for the epitaxial growth and capping of GaAs
[AD-A097410] N81-23928

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD.
Space systems: An auroral imaging spectrophotometer (vacuum ultraviolet and visible)
[PB81-133621] N81-23446
Vacuum-deposited polycrystalline silicon films for solar-cell applications
[SERI/TR-8278-1-T4] N81-23648
Astronomical programs: A canon of solar eclipses for the years -1500 to -1000
[PB81-133555] N81-23988

APPLIED PSYCHOLOGICAL SERVICES, WAYNE, PA.
Computer simulation of human performance in electronic processed imagery systems
[AD-A097622] N81-23801

ARGONNE NATIONAL LAB., ILL.
Effects of curvature on asymmetric steady states in catalyst particles
[ANL-81-7] N81-23227
Development of nondestructive evaluation techniques for high-temperature ceramic heat exchanger components
[ANL-80-123] N81-23292

Illinois biomass resources. Annual crops and residues; canning and food-processing wastes, preliminary assessment
[ANL/EMR-6] N81-23573
Health and safety: Preliminary comparative assessment of the Satellite Power System (SPS) and other energy alternatives
[NASA-CR-164215] N81-23594
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670
Preliminary assessment of the Satellite Power System (SPS) and six other energy technologies
[ANL/AA-20] N81-23692
District heating from electric-generating plants and municipal incinerators: Local planners assessment guide
[ANL/CNSV-12] N81-23699
Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722
Plan for the future of neutron research on condensed matter: An Argonne National report prepared in response to the report of the Review Panel on Neutron Scattering
[ANL-81-5] N81-23878
D-D Tokamak reactor studies
[ANL/FPP/TM-138] N81-23907
GPSAP/V2 with applications to open-cycle MHD systems
[ANL/MHD-80-15] N81-23908
Wave-driver options for low-aspect-ratio steady-state Tokamak reactors
[ANL/FPP/TM-141] N81-23915

ARINC RESEARCH CORP., ANNAPOLIS, MD.
Guide for the assessment of the reliability of gasification-combined-cycle power plants
[EPRI-AP-1610] N81-23704
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 1: NDI maintenance data analysis
[AD-A097669] N81-23938
The Air Force nondestructive inspection management information system development program. Phase 2: Preliminary design and approval. Task 2: On-site data collection
[AD-A097670] N81-23939

ARIZONA UNIV., TUCSON.
Kinetic studies of heterogeneous biocatalysis using the rotating ring-disk enzyme electrode N81-23199
Coherent transient effect studies of Rydberg atoms
[AD-A097588] N81-23207
In-place polymerizations of electrophilic olefins
[AD-A097453] N81-23277
A high voltage linear compatible Integrated Injection Logic (IIL) structure: Process design and specifications N81-23376
Automatic methods in image processing and their relevance to map-making
[AD-A097377] N81-23566
The Coolidge Solar Irrigation Project
[SAND-80-2378] N81-23705

ARKANSAS POWER AND LIGHT CO., LITTLE ROCK.
Research and development of a 3 MW power plant from the design, development, and demonstration of a 100 KW power system utilizing the direct contact heat exchanger concept for geothermal brine recovery project
[DOE/ET-28456/T1] N81-23656

ARKANSAS UNIV., FAYETTEVILLE.
Construction procedures using self hardening fly ash
[PB81-153884] N81-23334
Effects of changes in surface water regime and/or land use on the vertical distribution of water available for wetland vegetation. Part 1: Dynamic model of the zone of aeration
[PB81-145047] N81-23586

ARMCO STEEL CORP., MIDDLETOWN, OHIO.
Localized corrosion in materials for geothermal power
[DOE/ET-28317/T1] N81-23256

ARMY AVIATION DEVELOPMENT TEST ACTIVITY, FORT RUCKER, ALA.
Functional testing airborne navigation equipment
[AD-A097115] N81-23062
Functional testing airborne radars
[AD-A097562] N81-23358

ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N. H.
Building under cold climates and on permafrost. Collection of papers from a US-Soviet Joint Seminar
[AD-A097516] N81-23327

ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
Calculating building heating and cooling loads using the frequency response of multilayered slabs
[AD-A097597] N81-23326
Life-cycle cost database design and sample data development
[AD-A097222] N81-23949

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND, FORT MONMOUTH, N. J.
Electrochemical behavior of copper in thionyl chloride solutions
[AD-A097425] N81-23211

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Improving the distribution and reducing the magnitude of pavement damage
[PB81-145864] N81-23333

ARMY INST. OF DENTAL RESEARCH, WASHINGTON, D. C.
The effect of cooling rate on the apparent bond strength of porcelain-metal couples
[AD-A097492] N81-23279

ARMY MISSILE COMMAND, REDSTONE ARSENAL, ALA.
Acoustical holographic recording with coherent optical read-out and image processing
[AD-A097299] N81-23439

ARTECH CORP., FALLS CHURCH, VA.
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604

ASSOCIATION UNIVERSITAIRE POUR LE DEVELOPPEMENT DE L'ENSEIGNEMENT ET DE LA CULTURE EN AFRIQUE ET A MADAGASCAR, PARIS (FRANCE).
Symphonie program planned for Ivory Coast 1979 - 1980 N81-23156

ATMOSPHERIC SCIENCES LAB., WHITE SANDS MISSILE RANGE, N. MEX.
Evaluation of a tethered kite anemometer
[AD-A097082] N81-23440
Weather scenarios for central Germany
[AD-A097527] N81-23771
Air mass considerations in fog optical modeling
[AD-A097609] N81-23772

ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON (ENGLAND).
Library records: In-house file creation versus external services N81-23964

ATSUKO COMPUTING INTERNATIONAL, HUNTSVILLE, ALA.
Research study: STS-1 Orbiter Descent
[NASA-CR-161754] N81-23763

AURORAL OBSERVATORY, TROMSO (NORWAY).
Currents in the auroral zone ionosphere N81-23518
Neutral winds in the polar ionosphere N81-23519

AUTOMATION INDUSTRIES, INC., SILVER SPRING, MD.
Performance of active solar space-cooling systems: The 1980 cooling season
[SOLAR/0023-81/40] N81-23647

AUTOMOTIVE ENVIRONMENTAL SYSTEMS, INC., WESTMINSTER, CALIF.
Testing of new technology: Three-way catalyst equipped vehicles in Los Angeles
[PB81-138075] N81-23474

B

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
Analytic model and numerical simulation of shock wave propagation into a reentrant corner
[AD-A097471] N81-23423

BARTON-ASCHMAN ASSOCIATES, INC., CHICAGO, ILL.
Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722

BATTELLE COLUMBUS LABS., DURHAM, N. C.
Soils of Israel and their similarity to soils of the United States
[AD-A097528] N81-23564
Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel
[AD-A097529] N81-23767

BATTELLE COLUMBUS LABS., OHIO.
STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469
Comparative analysis of techniques for evaluating the effectiveness of aircraft computing systems
[NASA-CR-159358] N81-23477
Assessment of nickel-hydrogen batteries for terrestrial solar applications
[SAND-80-7191] N81-23706
Mechanical Properties Data Center
[AD-A097389] N81-23945

BATTELLE INST., FRANKFURT AM MAIN (WEST GERMANY).
Development of single-crystals CdTe solar cells for terrestrial application in optical concentrators
[BMFT-FB-T-80-060] N81-23652
Development of a computer-aided method for the techno-economic evaluation of R and D projects in the mining area. Stage 1: Development of the concept and identification of application
[BMFT-FB-T-80-130] N81-23969

BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Relationships of dispersive mass transport and stochastic convective flow through hydrologic systems
[PNL-3302] N81-23428
The strontium heat source development program
[PNL-1845-48] N81-23503
Wind energy resource atlas. Volume 9: The Southwest region
[PNL-3195WERA-9-VOL-9] N81-23634
Exploratory benefit-cost analysis of environmental controls on hydrothermal energy
[PNL-3527] N81-23725
Review of high-level waste form properties
[PNL-3035] N81-23882

BEIJING UNIV. (CHINA).
Carrier frequency stability and its effect on phase shift keying signals in the satellite channel N81-23123

BEIJING UNIV., SHIJIAZHUANG HEBEI (CHINA).
Experimentation with a Spread Spectrum Multiple Access communication system via the Symphonie satellite N81-23115
Experiments with a long time delay phase-locked loop via the satellite Symphonie N81-23124

BELL TELEPHONE MFG. CO., ANTWERP (BELGIUM).
Design and implementation of a small terminal for the Everest 78 expedition N81-23122

BIONETICS CORP., HAMPTON, VA.
Cumulative annoyance due to multiple aircraft flyover with differing peak noise levels
[NASA-CR-3417] N81-23712

BOEING AEROSPACE CO., SEATTLE, WASH.
Development of maintenance METRICS to forecast resource demands of weapon systems (parameter polarization), revision A
[AD-A097692] N81-23325
Instructor/operator display evaluation methods
[AD-A097208] N81-23802
Weapons system support resources demand parameters - logistics
[AD-A097517] N81-23937

BOEING CO., SEATTLE, WASH.
Flaw growth of 6Al-4V STA titanium in nitrogen tetroxide with low nitric oxide content
[NASA-CR-160945] N81-23242

BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
MLS: Airplane system modeling
[NASA-CR-165700] N81-23059

BOEING MILITARY AIRPLANE DEVELOPMENT, SEATTLE, WASH.
Oscillating supercritical airfoils in the transonic regime with viscous interactions N81-23047
BOEING VERTOL CO., PHILADELPHIA, PA.
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 1: Engineering studies [NASA-CR-152336-1] N81-23064
Preliminary design study of advanced composite blade and hub and nonmechanical control system for the tilt-rotor aircraft. Volume 2: Project planning data [NASA-CR-152336-2] N81-23065
Rotorcraft aviation icing research requirements: Research review and recommendations [NASA-CR-165344] N81-23070
A study of the effect of terrain on helicopter noise propagation by acoustical modeling [AD-A097626] N81-23864
BOLT, BERANEK, AND NEWMAN, INC., CAMBRIDGE, MASS.
Detection thresholds for multitarget tracking in clutter [AD-A097188] N81-23350
Procedural semantics as a theory of meaning [AD-A097630] N81-23815
BONN UNIV. (WEST GERMANY).
Electrodynamics of the lower ionosphere N81-23516
BOSTON COLL., CHESTNUT HILL, MASS.
A summary of rocket-induced ionospheric perturbations N81-23522
BOSTON UNIV., MASS.
A summary of rocket-induced ionospheric perturbations N81-23522
BRITISH BROADCASTING CORP., KINGSWOOD (ENGLAND).
Digital transmission tests of multiplexed video and audio signals at 60 Mbit/s via Orbital Test Satellite (OTS) [BBC-RD-1980/16] N81-23342
BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste [BNL-28668] N81-23228
Theoretical implications on ISABELLE physics [BNL-28825] N81-23916
Numerical techniques for lattice gauge theories [BNL-29048] N81-23932
BROWN UNIV., PROVIDENCE, R. I.
Next steps in two-phase flow: Executive summary [DOE/ET-27225/12] N81-23429
BUREAU OF MINES, ALBANY, OREG.
Effects of additives on methanation activity of Raney nickel catalysts [BM-RI-8487] N81-23217
Partial pressures of gaseous HCl and H2O over aqueous solutions of HCl, AlCl3, and FeCl3 [PB81-147381] N81-23232
Iron-base alloys strengthened by Laves phases as substitutes for stainless steels [PB81-150153] N81-23268
Silver recovery from aircraft scrap [PB81-150021] N81-23269
Shape-casting titanium in olivine, garnet, chromite, and zircon rammed and shell molds [PB81-147274] N81-23475
Cladding of metals to iron by vacuum rolling [PB81-150096] N81-23476
BUREAU OF MINES, AMARILLO, TEX.
Helium resources of the United States, 1979 [PB81-150146] N81-23582
Helium: Its relationship to geologic systems and its occurrence with the natural gases, nitrogen, carbon dioxide and argon [PB81-151995] N81-23587
BUREAU OF MINES, AVONDALE, MD.
Experimental processing of salt slags from an aluminum dross furnace [PB81-135022] N81-23264
Atmospheric corrosion resistance of steels prepared from the magnetic fraction of urban refuse [PB81-148215] N81-23265
Characterization of alloys formed by ion implantation [PB81-148223] N81-23270
Electrochemical corrosion of iron-chromium alloys under ultra-high-purity conditions [PB81-147134] N81-23271
Development of analytical reference materials for refuse-derived fuels [PB81-135030] N81-23323
BUREAU OF MINES, PITTSBURGH, PA.
The theory of flammability limits. Conductive-convective wall losses and thermal quenching [PB81-150047] N81-23233
Controlled burnout of wasted coal on abandoned coal mine lands [PB81-148231] N81-23234
Electrochemical corrosion behavior of alloys formed by ion implantation [PB81-135006] N81-23266
Review of horizontal drilling technology for methane drainage from U.S. coalbeds [PB81-148181] N81-23590
Guide to substation grounding and bonding for mine power systems [PB81-148264] N81-23592
BUREAU OF MINES, ROLLA, MO.
Electrolytic reduction of chromium (6) and copper using coke electrodes [PB81-148249] N81-23263
BUREAU OF MINES, SPOKANE, WASH.
Shaft design in the Coeur d'Alene Mining District, Idaho: Results of in situ stress and physical property measurements [PB81-148199] N81-23591
BUREAU OF MINES, TUSCALOOSA, ALA.
A continuous dielectric separator for mineral beneficiation [PB81-135014] N81-23581
BUREAU OF MINES, TWIN CITIES, MINN.
Utilizing the magnetic fraction of raw refuse with shredded automobile scrap in cupola gray iron [PB81-150161] N81-23267
High-temperature corrosion resistance of alumina refractories to lignite ash slags [PB81-148272] N81-23299
Structure response and damage produced by airblast form surface mining [PB81-148918] N81-23593

C

CALIFORNIA INST. OF TECH., PASADENA.
The development and application of novel methods for the solution of EMP shielding problems [AD-A097362] N81-23356
Thin film optical devices and quantum electronics [AD-A097246] N81-23450
CALIFORNIA STATE DEPT. OF TRANSPORTATION, SACRAMENTO.
In-situ measurement of soil properties [PB81-130064] N81-23328
CALIFORNIA STATE UNIV., SACRAMENTO.
Synthesis of hydroxy-terminated dinitropropyl acrylate polymers [AD-A097577] N81-23291
CALIFORNIA UNIV., BERKELEY.
Magnetic-field effects on photosensitized electron transfer reactions [LBL-12361] N81-23222
Kinetics of photosensitized electron transport across a membrane boundary [LBL-12360] N81-23223
Mechanisms of erosion/corrosion of metals and their oxide scales [LBL-12023] N81-23255
Turbulent flow and heat transfer in passage around 180 degree bend: An experimental and numerical study [AD-A097461] N81-23421
Remote sensing of water quality in reservoirs and lakes in semi-arid climates [NASA-CR-166178] N81-23553
Regional comparisons of on-site solar potential in the residential and industrial sectors [LBL-11789] N81-23695
Sensitivity and response time improvements in millimeter-wave spectrometers [LBL-8789] N81-23726
Policy options for the transportation-air-quality process [PB81-150914] N81-23737

Controllability for distributed bilinear systems [AD-A097411] N81-23828
Some results on the overall reliability of undirected graphs [AD-A097445] N81-23832
The Hamiltonian structure of the Maxwell-Vlasov Equations [AD-A097412] N81-23834
Extended rate equations [UCID-18932] N81-23879
CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Hollow-fiber membranes for photosensitized electron transport [LBL-12359] N81-23220
Surface science and heterogeneous catalysts [LBL-11690] N81-23230
Competing reaction channels in IR-laser-induced unimolecular reactions [LBL-12213] N81-23455
Semiconductor detectors for medical tomography with high-energy heavy ions [LBL-11037] N81-23790
Particle simulation code for longitudinal dynamics of heavy ion beams [LBL-12205] N81-23910
CALIFORNIA UNIV., DAVIS.
X-ray diffraction study of residual stress in model weldments [UCRL-15332] N81-23504
Research on the hylife liquid first wall concept for future laser fusion reactors [UCRL-15314] N81-23919
CALIFORNIA UNIV., IRVINE.
Analytical applications of ion cyclotron resonance mass spectroscopy N81-23201
Environmental quality research fish and aufwuchs bioassay [AD-A097080] N81-23714
CALIFORNIA UNIV., LIVERMORE.
Two-wavelength HeNe laser interferometer [UCID-18988] N81-23456
CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Effect of vinyl and phenyl contents of silicone gum on the properties of the elastomers and cellular silicone cushions [UCRL-53105] N81-23298
MFTF Thomson scattering: A system study [UCRL-53051] N81-23371
Survey of hydrogen monitoring devices [UCRL-84164] N81-23444
Constitutive models for compressive loading of geologic materials [UCRL-53073] N81-23757
Recursive least squares with linear constraints [UCRL-85330] N81-23837
Sausage mode of a pinched charged particle beam [UCID-18940] N81-23885
Plasmas in particle accelerators: Adiabatic theories for bunched beams [UCID-18947] N81-23920
Fusion component design for the moving-ring field-reversed mirror reactor [UCID-18916] N81-23922
System data structures for on-line distributed data base management system [UCID-18912] N81-23950
Comparison of future battery systems for application to general-purpose electric vehicles [UCRL-53092] N81-23980
Advanced electric vehicle [UCRL-53089] N81-23981
CALIFORNIA UNIV., LOS ANGELES.
On the origins of homogeneous and inhomogeneous linewidths of the (D-5)0-(F-7)0 transition of Eu-3(+) in amorphous solids [AD-A097614] N81-23212
An efficient code for the simulation of nonhydrostatic stratified flow over obstacles [NASA-CR-3385] N81-23762
CALIFORNIA UNIV., SAN DIEGO.
Studies in digital optical processing N81-23886
CALIFORNIA UNIV., SANTA BARBARA.
Analysis of an nn+ low-high junction and the application to integrated injection logic devices N81-23375

CALSPAN ADVANCED TECHNOLOGY CENTER, BUFFALO, N.Y.
An investigation of marine fog forecast concepts [AD-A097338] N81-23778
CAMBRIDGE HYDRODYNAMICS, INC., MASS.
Studies of compressible shear flows and turbulent drag reduction [NASA-CR-165690] N81-23414
CANADA INST. FOR SCIENTIFIC AND TECHNICAL INFORMATION, OTTAWA (ONTARIO).
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters [ISSN-0077-5606] N81-23412
CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
Novel passive and active optical devices in waveguide structures N81-23887
CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Localized corrosion in materials for geothermal power [DOE/ET-28317/T1] N81-23256
A single-expression formula for inverting strain-life and stress-strain relationships [NASA-CR-165347] N81-23491
Selection of secondary keys and indices for a database N81-23943
CENTRE COMMUN D'ETUDES DE TELEVISION ET DE TELECOMMUNICATIONS, RENNES (FRANCE).
Digital television transmission experiment via Symphonie N81-23128
CENTRE D'ETUDES ET DE RECHERCHES, TOULOUSE (FRANCE).
Methods for calculating unsteady turbulent boundary layers N81-23048
CENTRE NATIONAL D'ETUDES DES TELECOMMUNICATIONS, ISSY-LES-MOULINEAUX (FRANCE).
Results of the 60 Mbit/s TDMA system. Tests via Symphonie N81-23114
The Celtic system: An experiment with Symphonie N81-23117
The effects of auroral activity on the midlatitude ionosphere N81-23517
Thermospheric neutral composition changes and their causes N81-23524
CENTRE NATIONAL D'ETUDES DES TELECOMMUNICATIONS, LANNION (FRANCE).
Transportable ground stations N81-23140
CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE (FRANCE).
Symphonie Symposium, 1980 N81-23101
The Symphonie program: Objectives, operations and technical operations of the project N81-23103
Two-way time transfers between National Research Council (Ottawa) and Paris Observatory via the Symphonie satellite N81-23134
Symphonie orbit: Determination and orbit; manoeuvre activities N81-23147
Methods and techniques used for Symphonie attitude determination and control N81-23148
Symphonie: In-flight performance of telemetry-telecommand, power supply, thermal control and transponder subsystems N81-23149
Summary of operating experience with the Symphonie satellites N81-23150
In-orbit control of geostationary satellites. Panel discussion C N81-23151
Public service. Panel discussion D N81-23161
The French German broadcasting satellite program N81-23170
Requirements for domestic and regional telecommunications satellites: Panel discussion E N81-23172
CENTRO DE DOCUMENTACAO CIENTIFICA E TECNICA, LISBON (PORTUGAL).
Portuguese scientific and technical information scene: Present status and future prospects N81-23957
CHEVRON RESEARCH CO., RICHMOND, CALIF.
Refining and upgrading of synfuels from coal and oilshales by advanced catalytic processes [FE-2315-58] N81-23311
CINCINNATI UNIV., OHIO.
Computer utilization in analytical instrumentation N81-23200
Intramolecular flexibility of relatively rigid polymers, and intermolecular interactions in ordered polymer systems, part 2 [AD-A097424] N81-23284
Polyurethane fan-out waveguide arrays and computer simulation to control crosstalk in imaging arrays N81-23340
Investigation of some multiple input/output frequency response function experimental modal analysis techniques N81-23481
CITY UNIV. OF NEW YORK, N. Y.
The effect of surface boundary conditions on the climate generated by a coarse-mesh general circulation model [NASA-CR-164296] N81-23765
CLARKSON COLL. OF TECHNOLOGY, POTSDAM, N.Y.
Suppression of narrowband interference in pseudo-noise spread spectrum systems [AD-A097336] N81-23368
Fluorescent scattering by molecules embedded in small particles [DOE/EV-04361/T2] N81-23869
CLEMSON UNIV., S.C.
Five-year water resources research and development goals, objectives and priorities for South Carolina, 1982-1987 [PB81-134918] N81-23585
A goodness-of-fit test based on spacings [AD-A097613] N81-23851
An empirical model building criterion based on prediction with applications in parametric cost estimation [AD-A097535] N81-23852
A Monte Carlo study of AR(1) estimators under several performance criteria [AD-A097533] N81-23853
The accuracy of a modified Peizer Approximation to the hypergeometric distribution, with comparisons to some other approximations [AD-A097541] N81-23854
Parametric cost methodology [AD-A097537] N81-23855
On the degree of inflation of measures of fit induced by empirical model building [AD-A097536] N81-23856
A cost function for military airframes [AD-A097538] N81-23966
A cost function for an airframe production program [AD-A097540] N81-23967
Some propositions on cost functions [AD-A097539] N81-23970
CNR, INC., NEEDHAM, MASS.
Channel measurement decoding for troposcatter communications [AD-A097620] N81-23367
COLORADO STATE UNIV., FORT COLLINS.
Metallic species derived from fluidized bed coal combustion [DOE/MC-08196/T1] N81-23257
COLUMBIA UNIV., PALISADES, N.Y.
Feasibility of large scale deliberate tracer release experiments in or below the oceanic thermocline [DOE/EV-10038/1] N81-23783
COMBUSTION ENGINEERING, INC., WINDSOR, CONN.
Industrial application of C-Es coal-gasification process [FE-1545-86] N81-23308
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION (U. S. SENATE).
National Aeronautics and Space Administration Authorization Act, 1982 [S-REPT-97-100] N81-23973
COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).
National Aeronautics and Space Administration Authorization Act, 1982 [H-REPT-97-32] N81-23971
Authorizing appropriations to the National Aeronautics and Space Administration for fiscal year 1982 [H-REPT-97-32] N81-23972
COMMUNICATION ENGINEERING INST., BEIJING (CHINA).
The Symphonie experiment in China N81-23112
COMMUNICATIONS RESEARCH CENTRE, OTTAWA (ONTARIO).
On-orbit control of the Communications Technology Satellite (CTS)/HERMES N81-23145
COMPTROLLER GENERAL OF THE UNITED STATES, WASHINGTON, D.C.
Oil and natural gas from Alaska, Canada, and Mexico: Only limited help for US [EMD-80-72] N81-23552
Federal-State environmental programs: The State perspective [CED-80-106] N81-23711
Learning to look ahead: The need for a national materials policy and planning process [EMD-79-30] N81-23974
COMPUTER SCIENCES CORP., BAY ST. LOUIS, MISS.
TNT equivalency of bulk nitrocellulose [AD-A097472] N81-23303
CONGRESSIONAL RESEARCH SERVICE, WASHINGTON, D.C.
Information services for legislative policy making N81-23965
CONSIGLIO NAZIONALE DELLE RICERCHE, ROME (ITALY).
SIRIO in-orbit control N81-23144
CONTROL DATA CORP., MINNEAPOLIS, MINN.
Mesoscale variability of the atmospheric wind field below 5 km [AD-A097414] N81-23773
CORNELL UNIV., ITHACA, N. Y.
Prediction of the turbulent wake with second-order closure [NASA-CR-164294] N81-23038
ESR studies of surface adsorption and catalysts under ultrahigh vacuum conditions [DOE/ER-04991/2] N81-23229
Pyrolysis of coal-derived fuels using the laser-powered homogeneous pyrolysis technique [DOE/PC-30217/T1] N81-23320
Ethanol production in northern New York: Technical and economic feasibility [PB81-144438] N81-23322
Development of a model for estimating the extent of river flooding with satellite and in situ data [PB81-152035] N81-23588
Defect structure of EFG silicon ribbon [NASA-CR-164324] N81-23618
Attenuation and coupling of far infrared surface plasmons N81-23888
An experimental study of electronic states at metal dielectric interfaces [AD-A097363] N81-23929
Influence of grain boundaries on the electrical properties of polycrystalline-silicon films [DOE/ER-02899/T2] N81-23933

D

DARTMOUTH COLL., HANOVER, N.H.
Advanced system demonstration for utilization of biomass as an energy source, executive summary [DOE/ET-20055/T3-EXEC-SUMM] N81-23596
DECISION SCIENCE CONSORTIUM, INC., FALLS CHURCH, VA.
An assessment of Markov renewal models in forecasting international affairs [AD-A097295] N81-23839
Alternative frameworks for the reconciliation of probability assessments [AD-A097584] N81-23850
DECISIONS AND DESIGNS, INC., MCLEAN, VA.
An assessment of Markov renewal models in forecasting international affairs [AD-A097295] N81-23839
DEFENCE AND CIVIL INST. OF ENVIRONMENTAL MEDICINE, DOWNSVIEW (ONTARIO).
Digital hand-held temperature monitor [AD-A097130] N81-23441
DEFENCE RESEARCH ESTABLISHMENT ATLANTIC, DARTMOUTH (NOVA SCOTIA).
X-ray fluorescence spectrometric analysis of wear metals in used lubricating oils [AD-A097552] N81-23087
DEFENCE RESEARCH ESTABLISHMENT, OTTAWA. (ONTARIO).
Some topics in applied electrochemical kinetics [AD-A097405] N81-23206
DELCO ELECTRONICS, SANTA BARBARA, CALIF.
The 15kW General Purpose Power Conditioner (frequency changer), inverter/ converter integration [AD-A097165] N81-23380

DENVER RESEARCH INST., COLO.
Symposium on the transfer and utilization of particulate control technology. Volume 3: Particulate control devices
[PB81-144800] N81-23734
DENVER UNIV., COLO.
Solar extinction radiometry
[NASA-CR-164290] N81-23993
DEPARTMENT OF COMMUNICATIONS, OTTAWA (ONTARIO).
Communication satellites in Canada N81-23169
DEPARTMENT OF ENERGY, LAS VEGAS, NEV.
Nevada nuclear waste storage investigations
[NVO-196-20] N81-23881
DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Analysis of the market and product costs for coal-derived high Btu gas: Staff working paper
[DOE/FE-0011] N81-23319
Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604
Short-term energy outlook. Volume 2: Methodology
[DOE/EIA-0202/4-VOL-2] N81-23654
International energy indicators
[DOE/IA-0010/8] N81-23655
Comparing energy technology alternatives from an environmental perspective
[DOE/EV-0109] N81-23688
US central station nuclear electric generating units: Significant milestones, status as of October 1, 1980
[DOE/NE-0030/4(80)] N81-23700
Geothermal energy geopressure subprogram
[DOE/EA-0134] N81-23721
National Energy Information System basic concepts
[DOE/EIA-0229] N81-23951
Energy information referral directory, fourth quarter 1980
[DOE/EIA-0205(80-4Q)] N81-23952
Electric and hybrid vehicle program
[DOE/CS-0026/13] N81-23979
DEPARTMENT OF NATIONAL DEFENCE, OTTAWA (ONTARIO).
Defense SDI: A useful current awareness system
[AD-A097084] N81-23946
DEUTSCHE BUNDESPOST, DARMSTADT (WEST GERMANY).
Transmission of TDMA signals at 60 Mbit/s in the Symphonie system N81-23113
Analysis of brief duration losses and error structures in satellite links N81-23125
DEUTSCHE BUNDESPOST, RAISTING (WEST GERMANY).
Experiments selected for the telecommunications test program of the German Post Office N81-23109
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BONN (WEST GERMANY).
The Symphonie ground stations N81-23107
Utilization analysis of the experimental satellite system Symphonie N81-23108
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE (WEST GERMANY).
Symphonie Symposium, 1980 N81-23101
Experimental utilization of the Symphonie system during the first 5 years of operation N81-23104
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).
Viscous effects on unsteady airloads of oscillating configurations N81-23049
Some remarks on the unsteady airloads on oscillating control surfaces in subsonic flow N81-23055
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN (WEST GERMANY).
Computer networking experiment via the Symphonie satellite N81-23131
Organization and operational configuration of the Symphonie ground control system N81-23146
DEUTSCHE WELLE, COLOGNE (WEST GERMANY).
Satellite transmission serving radio and television N81-23152
DEUTSCHES ROTES KREUZ, BONN (WEST GERMANY).
Disaster relief communications via the Symphonie satellite N81-23159
DIRECTION GENERALE DES TELECOMMUNICATIONS, PLEUMEUR-BODOU (FRANCE).
Verification of payload specifications for Symphonie satellites N81-23110
Telecommunications services for special events N81-23160
The French satellite telecommunications program: Telecom 1 N81-23167
DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN (WEST GERMANY).
Autonomous antenna tracking system for mobile Symphonie ground stations N81-23142
DOUGLAS AIRCRAFT CO., INC., LONG BEACH, CALIF.
Study to develop improved fire resistant aircraft passenger seat materials
[NASA-CR-152408] N81-23058
Commercial aviation icing research requirements
[NASA-CR-165336] N81-23069
Fuel/engine/airframe trade off study
[AD-A097391] N81-23073
DRAPER (CHARLES STARK) LAB., INC., CAMBRIDGE, MASS.
ACOSS six (Active Control Of Space Structures)
[AD-A097206] N81-23183
DREXEL UNIV., PHILADELPHIA, PA.
Application of variable structure system theory to aircraft flight control
[NASA-CR-164321] N81-23093
Physical and chemical studies of chlorophyll in microemulsions
[DOE/ER-04452/3] N81-23788
Formulation of nonlinear network equations using topological potential functions N81-23860
DWYER-MERCER COUNTY DISTRICT PUBLIC LIBRARY, CELINA, OHIO.
Solar passive ceiling system
[DOE/R5-10148/2] N81-23637
DYNAMICS RESEARCH CORP., WILMINGTON, MASS.
Digital Avionics Information System (DAIS). Volume 1: Impact of DAIS concept on life cycle cost
[AD-A097339] N81-23083
Digital Avionics Information System (DAIS). Volume 2: Impact of DAIS concept on life cycle cost. Supplement
[AD-A097438] N81-23084

E

EATON INDUSTRIES OF HOUSTON, INC., TEX.
Testing geopressured geothermal reservoirs in existing wells
[DOE/ET-27081/2] N81-23570
EDGERTON, GERMESHAUSEN AND GRIER, INC., IDAHO FALLS, IDAHO.
Analyses of mixed-hydrocarbon binary thermodynamic cycles for moderate-temperature geothermal resources
[EGG-PG-G-80-041] N81-23644
Effects of surface-mapping corrections and synthetic-aperture focusing techniques on ultrasonic imaging
[EGG-FM-5314] N81-23865
Propane conversion in the vehicle fleet at the Idaho National Engineering Laboratory
[EGG-TRANS-5291] N81-23977
EDGERTON, GERMESHAUSEN AND GRIER, INC., WALTHAM, MASS.
Physical oceanographic data from the OTEC Punta Tuna, Puerto Rico site, September 1979 - June 1980
[LBL-12327] N81-23784
EIC, INC., NEWTON, MASS.
Development of photoelectrochemical cells based on compound semiconductors and nonaqueous electrolytes
[SERI/PR-8002-7-T1] N81-23214
EISENSTADT (MELVIN) AND ASSOCIATES, INC., ALBUQUERQUE, N. MEX.
Access to solar energy: The problem and its current status
[SAND-80-7081] N81-23635
ELECTRIC POWER RESEARCH INST., PALO ALTO, CALIF.
Workshop of Arc By-Products in Gas Insulated Equipment
[EPRI-EL-80-8-LD] N81-23396
Impact of operational experience on research and development
[EPRI-NP-1689-SR] N81-23397
Electric utility solar energy activities: 1980 survey
[EPRI-AP-1713-SR] N81-23633
Performance monitoring of ground-coupled solar-assisted heat pump systems
[EPRI-EM-1697] N81-23696
ELECTRONIC SYSTEMS DIV., HANSCOM AFB, MASS.
Challenges and opportunities in Air Forces tactical communications
[AD-A097677] N81-23352
ENERGETICS CORP., RICHARDSON, TEX.
Direct application of geothermal energy at the L'eggs Product Plant, Las Cruses, New Mexico
[DOE/ID-12047/3] N81-23636
ENERGY AND MINERALS RESEARCH CO., EXTON, PA.
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T2] N81-23460
Efficient ultrasonic grinding: A new technology for micron-sized coal
[DOE/ER-10466/T3] N81-23468
ENERGY RESEARCH CORP., DANBURY, CONN.
Evaluation of distributed gas cooling of pressurized PAFC for utility power generation
[NASA-CR-165303] N81-23600
ENVIRODYNE LTD., WATERLOO (ONTARIO).
Investigation of numerical modeling techniques for recirculations flows: Parts 1 and 2
[EPRI-CS-1665-PT-1] N81-23427
ENVIRONMENTAL MONITORING AND SUPPORT LAB., LAS VEGAS, NEV.
Four corners air monitoring
[PB81-144156] N81-23733
ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
NOAA Meteorology Laboratory support to the Environmental Protection Agency
[PB81-149072] N81-23732
ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.
Aquaculture systems for wastewater treatment: An engineering assessment
[PB81-156689] N81-23738
ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
Thick phase holograms
[AD-A097201] N81-23436
Determination of backscatter characteristics of sea ice using synthetic aperture radar data
[AD-A097341] N81-23565
High resolution imaging of space objects
[AD-A097359] N81-23894
EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Contributions to the 9th Symposium on aircraft integrated data systems
[ESA-TT-532] N81-23008
Experiences with a Flight Data Recording System (FDRS) in a German Airforce fighter bomber wing after field trials N81-23009
Engine parameter trend analysis with LEADS 200: Possibilities and limitations N81-23010
Investigations into local fault detection on turbojet engines N81-23011
Location of faults in jet engines by calculation of component characteristics N81-23012
The engine usage monitoring system: An heuristic approach to cost effective data monitoring and analysis N81-23013
Relationships for a flight performance computer N81-23014
Classification of operating conditions of turbomachines from solid borne sound N81-23015
Reduction of measured data and possibilities for early detection of sensor break-down N81-23016
Description of the British Civil Aviation Airworthiness Data Recording Programme (CAADRP) N81-23017
The SYDAS flight data processing system N81-23018
The use of aircraft integrated data system at KLM N81-23019

Navaids calibration evaluation with a computer-controlled avionics data acquisition system N81-23020
The reconstruction of flight paths from AIDS data with the aid of modern filtering methods N81-23021
Detection and location of faults in onboard aircraft systems with the aid of the Automatic Fault Identification System (AFIS) N81-23022
Processing of AIDS flight recorder data for a quick look with the aid of a hybrid computer system N81-23023
Linear-elastic and elastic plastic fracture mechanics of structural materials [ESA-TT-649] N81-23505
A climatological guide for Meteosat users [ESA-SP-1027] N81-23759

EUROPEAN SPACE OPERATIONS CENTER, DARMSTADT (WEST GERMANY).
Stationkeeping experience with OTS N81-23143
A climatological guide for Meteosat users [ESA-SP-1027] N81-23759

EUROSPACE, PARIS (FRANCE).
Studies and experiments by Eurospace in the field of education and public service N81-23154

EXXON RESEARCH AND ENGINEERING CO., LINDEN, N.J.
Radiation/catalytic augmented combustion [AD-A097442] N81-23208
Fundamental synthetic fuel stability study [DOE/BC-10045/12] N81-23316
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary [SAN-0307-1-VOL-1] N81-23671
Solar Thermal Enhanced Oil Recovery (STEOR), volume 2, sections 2-8 [SAN-0307-1-VOL-2] N81-23672
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 2: Appendices [SAN-0307-1-VOL-2-APP] N81-23673
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility [SAN-0307-1-VOL-3] N81-23674

F

FACHINFORMATIONSZENTRUM FUER ENERGIE, PHYSIK, MATHEMATIK G.M.B.H., EGGENSTEIN-LEOPOLDSHAFEN (WEST GERMANY).
National information services with international orientation N81-23959

FAILURE ANALYSIS ASSOCIATES, PALO ALTO, CALIF.
Cost-effectiveness of countermeasures to intergranular stress corrosion cracking in BWR piping [EPRI-NP-1703] N81-23252

FEDERAL AVIATION ADMINISTRATION, ATLANTIC CITY, N.J.
A microcomputer-based signal data converter for runway visual range measurements [AD-A097568] N81-23060
Summary of transponder data, May 1979 - November 1979 [AD-A097569] N81-23061
Groundspeed/airspeed differences as a wind shear indicator and flight evaluation of a DME-derived system to determine groundspeed [AD-A097566] N81-23768
Evaluation of the Transcribed Weather Broadcast (TWEB) system and alternatives. Volume 2: Cost analyses of the TWEB radio and telephone accessible mass weather dissemination services [AD-A097567] N81-23769

FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON, D.C.
Improving the distribution and reducing the magnitude of pavement damage [PB81-145864] N81-23333

FEREBEE, WALTERS AND ASSOCIATES, CHARLOTTE, N.C.
Solar heating and hot water system installed at Charlotte Memorial Hospital, Charlotte, North Carolina [NASA-CR-161731] N81-23606

FERSCHL (MICHAEL S.), MILWAUKEE, WIS.
The electric moped [DOE/R5-10157/2] N81-23976

FIRST RESEARCH INST. OF PTT, SHANGHAI (CHINA).
Signal fluctuations observed during the Symphonie experiment N81-23133

FLOW RESEARCH, INC., KENT, WASH.
Advanced electrode design for electrostatic precipitators [DOE/EV-10506/T1] N81-23395

FOSTER WHEELER CORP., LIVINGSTON, N.J.
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary [SAN-0307-1-VOL-1] N81-23671
Solar Thermal Enhanced Oil Recovery (STEOR), volume 2, sections 2-8 [SAN-0307-1-VOL-2] N81-23672
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 2: Appendices [SAN-0307-1-VOL-2-APP] N81-23673
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility. [SAN-0307-1-VOL-3] N81-23674

FOUNDATION SCIENCES, INC., PORTLAND, OREG.
Oregon-based activities in support of the Basalt Waste Isolation Project [RHO-BWI-SA-42] N81-23880

FRAUNHOFER INST., FREIBURG (WEST GERMANY).
Solar radiations and their interactions with the terrestrial environment N81-23509

FREIBURG UNIV. (WEST GERMANY).
The day-by-day variability of the ionospheric peak density N81-23539

G

GAS RESEARCH INST., CHICAGO, ILL.
Program to discover materials suitable for service under hostile conditions obtaining in equipment for the gasification of coal and other solid fuels [FE-1784-69] N81-23253

GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
DOD's use of remotely piloted vehicle technology offers opportunities for saving lives and dollars [AD-A097419] N81-23074
F-16 integrated logistics support: Still time to consider economical alternatives [PB81-137473] N81-23079
Ground water overdrafting must be controlled [PB81-156135] N81-23589

GENERAL ATOMIC CO., SAN DIEGO, CALIF.
Radioisotope space power generator [GA-A-15683] N81-23638
Response of a thermal barrier system to acoustic excitation in a gas turbine nuclear reactor [GA-A-16016] N81-23866
ONETWO: A computer code for modeling plasma transport in Tokamaks [GA-A-16178] N81-23901

GENERAL DYNAMICS CORP., FORT WORTH, TEX.
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 1: Study overview [NASA-CR-152391-VOL-1] N81-23030
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 2: Evaluation of prediction methodologies [NASA-CR-152391-VOL-2] N81-23031
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 3: Effects of configuration variations from baseline [NASA-CR-152391-VOL-3] N81-23032
Analysis of wind tunnel test results for a 9.39-per cent scale model of a VSTOL fighter/attack aircraft. Volume 4: RALS R104 aerodynamic characteristics and comparisons with E205 configuration aerodynamic characteristics [NASA-CR-152391-VOL-4] N81-23033

GENERAL ELECTRIC CO., SCHENECTADY, N. Y.
Assessment of gas turbine erosion. Volume 2: Erosion analysis and test planning [PB81-139677] N81-23091
Assessment of gas turbine erosion. Volume 1: Assessment of available erosion data [PB81-139685] N81-23092
High-temperature combustion gas turbine program [NYSERDA-80-12] N81-23470
High-reliability gas turbine combined-cycle development program. Phase 1: Summary [EPRI-AP-1681-SU] N81-23471
High-reliability gas turbine combined-cycle development program, phase 1, volume 2 [EPRI-AP-1681-VOL-2] N81-23472
High-temperature turbine technology program turbine simulator tests with coal-derived low-Btu gas fuel [FE-1806-92] N81-23473
Fuel cell power plant integrated systems evaluation [EPRI-EM-1670] N81-23694

GENERAL ELECTRIC CO., ST. PETERSBURG, FLA.
Study of local atomic and electronic structure in glassy metallic alloys [DOE/ER-10382/2] N81-23296
Molten carbonate fuel cell large stack development [PB81-145930] N81-23708

GENERAL MOTORS RESEARCH LABS., WARREN, MICH.
Infrared hole - Burning spectroscopy of matrix isolated ReO4(-) molecules N81-23447

GENERAL TECHNICAL SERVICES, INC., UPPER DARBY, PA.
Contributions to a thermodynamic model of Earth systems on rivers [NASA-CR-164272] N81-23506

GEOLOGICAL SURVEY, ANCHORAGE, ALASKA.
Water resources data for Alaska, water year 1979 [PB81-144818] N81-23580

GEOLOGICAL SURVEY, DENVER, COLO.
Changes of the Sq quiet daily variations of the geomagnetic field as a function of time of year and latitude [AD-A097159] N81-23744

GEOLOGICAL SURVEY, FLAGSTAFF, ARIZ.
Status and future of extraterrestrial mapping programs [NASA-CR-3390] N81-23989

GEOLOGICAL SURVEY, LINCOLN, NEBR.
Water resources data for Arkansas, water year 1979 [PB81-144842] N81-23579

GEOLOGICAL SURVEY, MALAYSIA.
Improving streamflow estimates through the use of LANDSAT [E81-10129] N81-23542

GEOLOGICAL SURVEY, RESTON, VA.
Heat Capacity Mapping Mission (HCMM) thermal surface water mapping and its correlation to LANDSAT [E81-10137] N81-23546

GEORGIA INST. OF TECH., ATLANTA.
A difference in efficiency between synchronous and asynchronous systems [AD-A097476] N81-23381
Refinements and validation testing of Human Operator Performance Emulator (HOPE) [AD-A097449] N81-23793
A study of poultry processing plant noise control techniques [NASA-CR-164291] N81-23863

GEORGIA UNIV., ATHENS.
Flux of energy and essential elements through the continental shelf ecosystem [DOE/EV-00639/22] N81-23728
High-energy hadron-hadron collisions [DOE/ER-00946/T1] N81-23877

GESELLSCHAFT FUER INFORMATION UND DOKUMENTATION, HEIDELBERG (WEST GERMANY).
Information transfer: Barriers and trends N81-23956

GJERDING (B. K.) SIMULATION ELECTRONICS, SEATTLE, WASH.
User's manual for flight Simulator Display System (FSDS) [NASA-CR-164295] N81-23095

GLOBAL WEATHER CONSULTANTS, INC., SAN JOSE, CALIF.
Wind energy resource atlas. Volume 9: The Southwest region [PNL-3195WERA-9-VOL-9] N81-23634

GOETTINGEN UNIV. (WEST GERMANY).
First results from the Tromsoe ionospheric modification facility N81-23521

GOVERNMENT OF INDIA, NEW DELHI.
The role of telecommunication satellites in developing countries N81-23102
GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
Aircraft wing weight build-up methodology with modification for materials and construction techniques
[NASA-CR-166173] N81-23068
Multinozzle plume flowfields
[AD-A097244] N81-23419
Electrochemical photovoltaic cells CdSe thin film electrodes
[SERI/TR-8002-8-T1] N81-23676

H

HARRY DIAMOND LABS., ADELPHI, MD.
The acousto-optic interaction in an infinite slab of isotropic material
[AD-A097202] N81-23892
HARVARD UNIV., CAMBRIDGE, MASS.
Assessment of the solar heating and cooling in residential building demonstration program
[DOE/PE-70278/T10] N81-23698
HAWAII UNIV., HONOLULU.
Underground residence times and chemical quality of basal groundwater in Pearl Harbor and Honolulu aquifers, Oahu, Hawaii
[PB81-135444] N81-23577
Recycling of sewage effluent by sugarcane irrigation: A dilution study, October 1976 to October 1978, Phase 2-A
[PB81-144669] N81-23983
HICKOK (EUGENE A.) AND ASSOCIATES, WAYZATA, MINN.
National runway friction measurement program
[AD-A097334] N81-23097
HITTMAN ASSOCIATES, INC., COLUMBIA, MD.
Models for residential-and commercial-sector energy conservation analysis: Applications, limitations, and future potential
[DOE/PE-70044/T3] N81-23639
HONEYWELL, INC., MINNEAPOLIS, MINN.
Demonstration Advanced Avionics System (DAAS) functional description
[NASA-CR-152405] N81-23080
Solar Thermal Enhanced Oil Recovery, (STEOR) Volume 1: Executive summary
[SAN-0307-1-VOL-1] N81-23671
Solar Thermal Enhanced Oil Recovery (STEOR), volume 2, sections 2-8
[SAN-0307-1-VOL-2] N81-23672
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 2: Appendices
[SAN-0307-1-VOL-2-APP] N81-23673
Solar Thermal Enhanced Oil Recovery (STEOR). Volume 3: Preliminary design for a pre-heat only solar facility
[SAN-0307-1-VOL-3] N81-23674
HONEYWELL ELECTRO-OPTICS CENTER, LEXINGTON, MASS.
Defect chemistry and characterization of Hg(1-x)Cd(x)Te
[NASA-CR-161746] N81-23924
Defect chemistry and characterization Hg(1-x)Cd(x)Te
[NASA-CR-161755] N81-23925
HONEYWELL SYSTEMS AND RESEARCH CENTER, MINNEAPOLIS, MINN.
Advanced target tracker concepts
[AD-A097358] N81-23890
HOUSTON UNIV., TEX.
Factors influencing the redox reactions of iron porphyrins N81-23197
HUGHES RESEARCH LABS., MALIBU, CALIF.
Maximum entropy image estimation analysis of image formation with thinned random arrays
[AD-A097357] N81-23349

I

ICF, INC., WASHINGTON, D. C.
Coal resource information. Volume 1: Coal resource information requirements
[EPRI-EA-673-VOL-1] N81-23571
Coal resource information, volume 2. Part 1: Review of major resource studies and ongoing research
[EPRI-EA-673-VOL-2-PT-1] N81-23572
IDAHO NATIONAL ENGINEERING LAB., IDAHO FALLS.
Analyses of mixed-hydrocarbon binary thermodynamic cycles for moderate-temperature geothermal resources
[EGG-PG-G-80-041] N81-23644
ILLINOIS INST. OF TECH., CHICAGO.
Diffusion mechanisms and degradation of environmentally sensitive composite materials
[COO-444-9] N81-23196
Fluidization using non-equilibrium thermodynamics
[PB81-153249] N81-23707
ILLINOIS STATE WATER SURVEY, URBANA.
Low-level convergence and the prediction of convective precipitation in south Florida
[AD-A097553] N81-23777
ILLINOIS UNIV. AT CHICAGO CIRCLE, CHICAGO.
Experimental and theoretical investigation of droplet deposition and heat transfer in air-water dispersed flow N81-23409
ILLINOIS UNIV. AT URBANA.
An investigation of unique metal complexes produced using polystyrene 2,2 prime-bipyridine as a support, and several hydrogenation catalysts derived from this copolymer
[AD-A097174] N81-23285
New techniques in digital signal processing for synthetic aperture radar
[AD-A097279] N81-23365
Termination of surface acoustic wave velocity and impedance differences between metal strips and free surface regions of metallic gratings
[AD-A097337] N81-23386
ILLINOIS UNIV. AT URBANA-CHAMPAIGN.
Energetic particle precipitation at middle and low latitudes N81-23526
Midlatitude sporadic-E layers N81-23530
ILLINOIS UNIV., CHAMPAIGN.
Applications of event-related brain potentials in human engineering
[AD-A097542] N81-23795
ILLINOIS UNIV., URBANA.
Studies of the role of metastables and doubly ionized species in the chemical and thermal structure of the Venusian and Martian ionospheres
[NASA-CR-164329] N81-23991
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Magnetospheric and ionospheric flow and the interplanetary magnetic field N81-23510
INDIAN PHOTO-INTERPRETATION INST., DEHRA DUN.
Seminar on Application of Aerial Photo-Interpretation and Remote Sensing Techniques for Natural Resources Survey and Environmental Analysis, abstracts
[PB81-145153] N81-23583
INDIAN SPACE RESEARCH ORGANIZATION, AHMEDABAD.
Satellite telecommunications experiments project: An overview N81-23111
Digital communication multiple access scheme N81-23116
Transportable terminals for STEP N81-23138
INDIAN SPACE RESEARCH ORGANIZATION, BANGALORE.
Indian domestic satellite (INSAT) system N81-23168
INDIANA UNIV. AT BLOOMINGTON.
Rank-order tests for the parallelism of several regression surfaces
[AD-A097166] N81-23857
INSTITUT FUER ASTROPHYSIK UND EXTRATERRESTRISCHE FORSCHUNG, BONN (WEST GERMANY).
On the morphology of the polar thermosphere N81-23528
INSTITUT FUER RUNDFUNKTECHNIK, MUNICH (WEST GERMANY).
Symphonie experience and selection of broadcasting standards for direct broadcasting satellite systems N81-23171
INSTITUT ROYAL METEOROLOGIQUE DE BELGIQUE, BRUSSELS.
Relations between solar flux and E-region parameters N81-23525
INSTITUT TECHNIQUE DU BATIMENT ET DES TRAVAUX PUBLICS, PARIS (FRANCE).
ARIANE: Building data bank N81-23961
INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels (riser cracking of coal)
[DOE/ET-10520/1] N81-23314
Coal gasification pilot plant support studies
[FE-2806-7] N81-23315
INTERGRAPH CORP., HUNTSVILLE, ALA.
Homing missile guidance studies: Observability, adaptability
[AD-A097624] N81-23178
INTERNATIONAL BUSINESS MACHINES CORP., HUNTSVILLE, ALA.
Solar energy system economic evaluation for Wormser Columbia, South Carolina
[NASA-CR-161722] N81-23605
Solar energy system economic evaluation for Colt Pueblo, Pueblo, Colorado
[NASA-CR-161725] N81-23607
INTERNATIONAL NICKEL CO., INC., SUFFERN, N. Y.
Weld overlaying for corrosion resistance in coal-gasification atmospheres
[FE-2621-15] N81-23254
INTERNATIONAL TELEPHONE AND TELEGRAPH CORP., NEW YORK.
Market capture by 30/20 GHz satellite systems. Volume 1: Executive summary
[NASA-CR-165231] N81-23345
Market capture by 30/20 GHz satellite systems, volume 2
[NASA-CR-165232] N81-23346
IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Measurement and analysis of the periodic variation of total pressure in an axial-flow compressor stage
[AD-A097296] N81-23090
ISTITUTO NAZIONALE DI GEOFISICA, ROME (ITALY).
Some considerations upon models for ionospheric radio communications forecasting N81-23541
ITT AVIONICS, NUTLEY, N.J.
S-band microwave system, revision
[AD-A097641] N81-23348
ITT ELECTRO-OPTICAL PRODUCTS DIV., ROANOKE, VA.
High precision fiber development
[AD-A097444] N81-23891

J

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Heat sterilizable solid-propellant development
[NASA-CR-164281] N81-23300
An analysis of source structure effects in radio interferometry measurements
[NASA-CR-164285] N81-23344
An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery
[NASA-CR-164279] N81-23562
Modeling misregistration and related effects on multispectral classification
[NASA-CR-164282] N81-23563
Photovoltaics Program Utility Interface Southwest Regional Workshop Proceedings
[NASA-CR-164284] N81-23601
Electric and hybrid vehicles charge efficiency tests of ESB EV-106 lead acid batteries
[NASA-CR-164283] N81-23602
Potential impacts of Brayton and Stirling cycle engines
[NASA-CR-164278] N81-23603
Anti-reflection coatings applied by acid leaching process
[NASA-CR-164322] N81-23612
Silicon materials task of the low-cost solar array project. Phase 4: Effects of impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613
The establishment of a production-ready manufacturing process utilizing thin silicon substrates for solar cells
[NASA-CR-164327] N81-23615
A Module Experimental Process System Development Unit (MEPSDU)
[NASA-CR-164325] N81-23616

Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617
Defect structure of EFG silicon ribbon
[NASA-CR-164324] N81-23618
Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621
Analysis and evaluation in the production process and equipment area of the low-cost solar array project
[DOE/JPL-954796-81/12] N81-23622
Block 5 solar cell module: Design and test specification for intermediate-load applications, 1981
[DOE/CS-31037/T1] N81-23693
Deep space network software cost estimation model
[NASA-CR-164277] N81-23814
Methodology for urban rail and construction technology research and development planning
[NASA-CR-164280] N81-23975
Telecommunications and data acquisition
[NASA-CR-164288] N81-23997
Radio Astronomy N81-23998
A frequency and timing subsystem for the ORION mobile unit N81-23999
ORION: Microwave water vapor radiometer subsystem design N81-24000
Poster error probability in the Mu-11 Sequential Ranging System N81-24001
Frequency standard test facility data acquisition and processing system N81-24002
A four-way distribution amplifier for reference signal distribution N81-24003
Station stability measurement N81-24004
High speed front end of the multimegabit telemetry demodulator detector N81-24005
ISPM X-band uplink technology demonstration. Part 1: Overview N81-24006
End-to-end quality measure for transmission of compressed imagery over a noisy coded channel N81-24007
Calculation of atmospheric loss from microwave radiometric noise temperature measurements N81-24008
Maximizing throughput over an average-power-limited and band-limited optical pulse position modulation channel N81-24009
Optimum design of hybrid phase locked loops N81-24010
The reliability of multistate, multioutput systems N81-24011
New results on antenna arraying, part 1 N81-24012
The 34-meter antenna-subreflector translations to maximize RF gain N81-24013
A decoding failure test for the transform decoder of Reed-Solomon code N81-24014
Radio frequency interference protection of communications between the Deep Space Network and deep space flight projects N81-24015
DSN scheduling system N81-24016
Computer simulated building energy consumption for verification of energy conservation measures in network facilities N81-24017
Reporting Capabilities and Management of the DSN Energy Data Base N81-24018

JOHNS HOPKINS UNIV., BALTIMORE, MD.
X-ray diffraction measurement of residual stress (strain): Energy dispersive X-ray residual stress measurement N81-23480

JOINT INST. FOR LAB. ASTROPHYSICS, BOULDER, COLO.
Research in laser processes
[AD-A097563] N81-23449

K

KAMAN AEROSPACE CORP., BLOOMFIELD, CONN.
Analytical testing
[NASA-CR-3429] N81-23487

KANSAS UNIV., LAWRENCE.
Pioneer Venus probe models instrumented prop tests
[NASA-CR-164298] N81-23174
Crop phenology and LANDSAT-based irrigated lands inventory in the high plains
[E81-10138] N81-23547
Crop-phenology and LANDSAT-based irrigated lands inventory in the high plains
[E81-10139] N81-23548

KANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
An investigation of drag reduction for a standard truck with various modifications
[NASA-CR-163107] N81-23040

KENTUCKY UNIV., LEXINGTON.
Hot-gas desulfurization. 1: Use of gasifier ash in a fixed-bed process
[DOE/ET-10463/T1-VOL-1] N81-23716

KING RADIO CORP., OLATHE, KANS.
Demonstration Advanced Avionics System (DAAS) functional description
[NASA-CR-152405] N81-23080

L

LANGUAGE SERVICES, KNOXVILLE, TENN.
Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909

LEHIGH UNIV., BETHLEHEM, PA.
Some thoughts on material stability
[AD-A097350] N81-23499
Some stability conditions for a compressible elastic material
[AD-A097351] N81-23500

LEICESTER UNIV. (ENGLAND).
First results from the Tromsoe ionospheric modification facility N81-23521
The generation and propagation of atmospheric gravity waves with special reference to radio propagation N81-23535
Experimental validation of the ONSOD Omega prediction method N81-23540

LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Electronic flight rules: An alternative separation assurance concept
[AD-A097570] N81-23063
Detection of electrically failed photovoltaic modules at MIT LL test sites
[DOE/ET-20279/112] N81-23650

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
Large wind turbine generator performance assessment
[EPRI-AP-1641] N81-23645

LOCKHEED ENGINEERING AND MANAGEMENT SERVICES CO., INC., HOUSTON, TEX.
An algorithm for the rapid location of an extreme of a function subject only to geometric restrictions
[NASA-CR-160940] N81-23812

LOCKHEED-GEORGIA CO., MARIETTA.
Trailing edge wake flow characteristics of upper surface blown configurations
[NASA-CR-152224] N81-23028

LOCKHEED MISSILES AND SPACE CO., HUNTSVILLE, ALA.
An analytical procedure and automated computer code used to design model nozzles which meet MSFC base pressure similarity parameter criteria
[NASA-CR-161757] N81-23187

LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
Magnetosphere-Ionosphere coupling through the auroral acceleration region N81-23513

LONDE-PARKER-MICHELS, INC., ST. LOUIS, MO.
Winter experience of a passive solar retrofit
[DOE/CS-34127/1] N81-23630

LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Role of military scientists and engineers in space (1980-2000)
[LA-UR-81-192] N81-23173
Space nuclear safety and fuel program
[LA-8749-PR] N81-23189
Instrument development for materials science research at WNR
[LA-UR-80-2969] N81-23442
Preliminary assessment of the impact of flywheel energy storage technology on taxicab fleet operation in a large metropolitan city
[LA-8722-MS] N81-23685
Review of the geothermal reservoir well stimulation program
[LA-UR-81-26] N81-23701
Decision graphs: A tool for developing real time software
[LA-UR-80-3502] N81-23823
Vectorization of algorithms for solving systems of difference equations
[LA-UR-81-270] N81-23836
Elastic scattering of polarized deuterons from hydrogen at 2.0, 1.6, and 1.2 GeV and search for critical opalescence in elastic scattering of protons from carbon-12 at 800 MeV
[LA-8662-T] N81-23872
Dissipation and diffusion in nuclear fission
[LA-UR-81-301] N81-23883
Ultraviolet phase conjugation and its practical implications
[LA-UR-81-145] N81-23898
X-ray diodes for laser fusion plasma diagnostics
[LA-7941-MS] N81-23904
Compact toroids generated by a magnetized coaxial source in the CTX experiment
[LA-UR-81-325] N81-23917
Stable heating and burn simulations of a reversed-field pinch reactor
[COO-2218-189] N81-23918
Plasma physics plotting package
[LA-8161-M] N81-23921
Dynamic theory: A new view of space, time, and matter
[LA-8370-MS] N81-23934
Continuing education through computer-aided instruction
[LA-UR-81-82] N81-23935
Online microfilm recorders of Los Alamos National Laboratory
[LA-UR-81-284] N81-23953

LOUISVILLE UNIV., KY.
Rank-order tests for the parallelism of several regression surfaces
[AD-A097166] N81-23857

LOVELACE BIOMEDICAL AND ENVIRONMENTAL RESEARCH INST., ALBUQUERQUE, N. MEX.
Fluidized-bed combustion emissions: Toxicology program
[LMF-83] N81-23718
Diesel-exhaust emissions-toxicology program
[LMF-81] N81-23719

M

MAR-TEST, INC., CINCINNATI, OHIO.
High temperature low cycle fatigue data for three high strength nickel-base superalloys
[AD-A097430] N81-23246

MARK RESOURCES, INC., MARINA DEL REY, CALIF.
Environment-adaptive radar techniques
[AD-A097262] N81-23351

MARQUETTE UNIV., MILWAUKEE, WIS.
Virtual photoproduction of hidden and open charm
[LBL-11844] N81-23870

MARYLAND UNIV., COLLEGE PARK.
Riometer investigations on the FRAM 1 ice island
[AD-A097518] N81-23754
Applicative specifications of distributed systems: Extending them to embedded systems
[AD-A097280] N81-23808
Evaluating a data abstraction testing system based on formal specifications
[AD-A097231] N81-23809
Software requirements: A report on the state of the art
[AD-A097278] N81-23821

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
An asymptotic unsteady lifting-line theory with energetics and optimum motion of thrust-producing lifting surfaces
[NASA-CR-165679] N81-23035
Preliminary results of a study of unsteady airfoil surface pressures and turbulent boundary layers
[AD-A097560] N81-23042
Sulfide inclusions in electroslag remelted steels
[AD-A097469] N81-23250
Homogeneous and heterogeneous rubbery/rubbery diblock copolymers and polymer blends - A unified view
[AD-A097690] N81-23287

High-temperature properties and processes in ceramics: Thermomigration
[DOE/ER-02923/4] N81-23295
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30075/4] N81-23317
Atmospheric optical communication systems
[AD-A097673] N81-23366
Comparison between the SIMPLE and ENERGY mixing models
[DOE/ET-37240/78TR] N81-23703
Evaluation of engineered foods for Closed Ecological Life Support System (CELSS)
[NASA-CR-160952] N81-23800
Properties of multivariable root loci
[NASA-CR-164319] N81-23829
Second derivative algorithms for minimum delay distributed routing in networks
[AD-A097623] N81-23835
Continuous model of an unreliable two-stage material flow system with a finite interstage buffer
[PB81-146862] N81-23859
Alloy development for irradiation performance in fusion reactors
[DOE/ER-10107/1] N81-23914
Computer simulation study of the structure of vacancies in grain boundaries
[DOE/ER-05002/15] N81-23931

MASSACHUSETTS UNIV., AMHERST.
Liquid crystal polymers: Thermotropic rigid aromatic copolyesters with bisphenol spacers
[AD-A097667] N81-23290

MATERIALS RESEARCH LABS., ASCOT VALE (AUSTRALIA).
Development of a gasless pyrotechnic cap
[AD-A097197] N81-23301

MAX-PLANCK-INSTITUT FUER AERONOMIE, KATLENBURG-LINDAU (WEST GERMANY).
Magnetospheric influences on the ionosphere N81-23511
First results from the Tromsoe ionospheric modification facility N81-23521
The seasonal and geographical variation of equatorial spread-F irregularities influenced by atmospheric gravity waves and electric fields due to thunderstorms N81-23531

MB ASSOCIATES, SAN RAMON, CALIF.
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-164323] N81-23621

MCDONNELL AIRCRAFT CO., ST. LOUIS, MO.
Investigation of the interaction of lift jets and a ground plane
[NASA-CR-152343] N81-23026

MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
Performance of the main subsystems of the Symphonie satellites N81-23106

MESSERSCHMIDT-BOELKOW G.M.B.H., MUNICH (WEST GERMANY).
Application of Symphonie experiences in follow-up projects at MBB N81-23163

METAL PROPERTIES COUNCIL, INC., NEW YORK.
Program to discover materials suitable for service under hostile conditions obtaining in equipment for the gasification of coal and other solid fuels
[FE-1784-69] N81-23253

METALLURGICAL CONSULTANTS, INC., MONTEBELLO, CALIF.
Manufacturing process feasibility study
[UCRL-15319] N81-23251

MIAMI UNIV., CORAL GABLES, FLA.
Thermal pollution math model. Volume 1: Thermal pollution model package verification and transfer
[NASA-CR-165623-VOL-1] N81-23554
Thermal pollution math model. Volume 2: Verification of one-dimensional numerical model at Lake Keowee
[NASA-CR-165623-VOL-2] N81-23555
Thermal pollution mathematical model. Volume 3: User's manual for one-dimensional numerical model for the seasonal thermocline
[NASA-CR-165623-VOL-3] N81-23556
Thermal pollution mathematical model. Volume 4: Verification of three-dimensional rigid-lid model at Lake Keowee
[NASA-CR-165623-VOL-4] N81-23557
Thermal pollution mathematical model. Volume 5: User's manual for three-dimensional rigid-lid model
[NASA-CR-165623-VOL-5] N81-23558
Thermal pollution mathematical model. Volume 6: Verification of three-dimensional free-surface model at Anclote Anchorage
[NASA-CR-165623-VOL-6] N81-23559
Thermal pollution mathematical model. Volume 7: User's manual for three-dimensional free-surface model
[NASA-CR-165623-VOL-7] N81-23560

MICHIGAN STATE UNIV., EAST LANSING.
An evaluation of satellite data for estimating the area of small forestland in the southern lower peninsula of Michigan
[E81-10136] N81-23545

MICHIGAN TECHNOLOGICAL UNIV., HOUGHTON.
The elasto-plastic behavior of inclusions N81-23238
The relationship between deformation and fracture in two phase elasto-plastic equiaxed alloys N81-23241

MICHIGAN UNIV., ANN ARBOR.
Controlled avalanche transit-time triode amplifiers
[AD-A097439] N81-23390
Heat generation in aircraft tires under free rolling conditions
[NASA-CR-164273] N81-23461
Simulation analysis of head/neck impact response for helmeted and unhelmeted motorcyclists
[PB81-145377] N81-23804

MIDWEST RESEARCH INST., GOLDEN, COLO.
Electric utility value determination for wind energy. Volume 1: A methodology
[SERI/TR-732-604-VOL-1] N81-23393
Electric utility value determination for wind energy. Volume 2: A user's guide
[SERI/TR-732-604-VOL-2] N81-23394
Assessment of existing studies of wind loading on solar collectors
[SERI/TR-632-812] N81-23501
Wind loading on tracking and field-mounted solar collectors
[SERI/TP-632-958] N81-23502
Solar thermal electric power information user study
[SERI/TR-751-750] N81-23689
Biomass energy systems information user study
[SERI/TR-751-748] N81-23690
Active solar heating and cooling information user study
[SERI/TR-751-747] N81-23691

MIDWEST RESEARCH INST., KANSAS CITY, MO.
Processing equipment for resource recovery systems. Volume 2: Magnetic separators, air classifier and ambient air emissions tests
[PB81-141590] N81-23324
Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661
Measurement of asbestos air pollution inside buildings sprayed with asbestos
[PB81-147001] N81-23731

MINISTERE DE L'EDUCATION PRIMAIRE ET DE LA TELEVISION EDUCATIVE, ABIDJAN (IVORY COAST).
Outcome of Symphonie experiments in Ivory Coast N81-23155

MINISTERE DES AFFAIRES ETRANGERES, PARIS (FRANCE).
Satellites and communications: Transmissions between France and Quebec via Symphonie N81-23153

MINNESOTA UNIV., MINNEAPOLIS.
Corrosion Research Center of the University of Minnesota
[DOE/ER-10450/1] N81-23294
A study of flicker noise in MOSFETS
[AD-A097557] N81-23389

MISSISSIPPI-ALABAMA SEA GRANT CONSORTIUM, OCEAN SPRINGS, MISS.
Hydrodynamics of Mobile Bay and Mississippi Sound
[PB81-137416] N81-23785

MISSISSIPPI STATE UNIV., MISSISSIPPI STATE.
A time domain simulation of a beam control system
[AD-A097423] N81-23453
A study of avionics time division multiplex bus simulation
[AD-A097375] N81-23810

MISSOURI UNIV. -COLUMBIA.
An analysis of opportunistic maintenance policy for the F100PW100 aircraft engine
[AD-A097548] N81-23025
A comparison of the ANCILLES and LOGIST parameter estimation procedures for the three-parameter logistic model using goodness of fit as a criterion
[AD-A097081] N81-23858

MISSOURI UNIV. -ROLLA.
Thermally stimulated currents in glasses N81-23272
Thermally stimulated polarization and depolarization current (TSPC/TSDC) in glass N81-23273

MISSOURI WATER RESOURCES CENTER, ROLLA.
Penetration of solar radiation in snow-ice covered water reservoirs: Winterkill
[PB81-149643] N81-23584

MITRE CORP., BEDFORD, MASS.
User's manual for strategic satellite system terminal segment life cycle cost model, volume 1
[AD-A097634] N81-23354
User's manual for strategic satellite system terminal segment life cycle cost model, volume 2
[AD-A097635] N81-23355
CCD multi-level logic
[AD-A097586] N81-23816

MITTELHAUSER CORP., DOWNERS GROVE, ILL.
Environmental assessment of the US Department of Energy electric and hybrid vehicle program
[ANL/CNSV-13] N81-23722

MONTANA STATE UNIV., MISSOULA.
Alteration of the response of the electron capture detector by addition of oxygen to the carrier gas N81-23202

MOTOROLA, INC., PHOENIX, ARIZ.
Anti-reflection coatings applied by acid leaching process
[NASA-CR-164322] N81-23612
The establishment of a production-ready manufacturing process utilizing thin silicon substrates for solar cells
[NASA-CR-164327] N81-23615
Sequential purification and crystal growth for the production of low cost silicon substrates
[DOE/SERI-8119/3-4] N81-23930

MOUNT HOLYOKE COLL., SOUTH HADLEY, MASS.
Studies of the photoelectrochemistry of organic dyes using attenuated total reflection techniques
[DOE/ER-10632/1] N81-23213

N

NANJING RADIO FACTORY (CHINA).
Transmission parameters of FDM/FM/FDMA telephone and FM television for domestic satellite system in China based on the experiment results via Symphonie N81-23164

NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
An evaluation of NASA's program for advancing rotorcraft technology
[PB81-144180] N81-23078

NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO).
The rejuvenation of properties in turbine engine hot section components by hot isostatic pressing
[AD-A097551] N81-23088

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
The utilization of nonterrestrial materials
[NASA-TM-83106] N81-23099
INTELSAT V-B (F-1) launch
[NASA-TM-82349] N81-23176
Scout/Navy transit improvement program (NOVA-1) launch
[NASA-TM-82350] N81-23177
Aboard the space shuttle
[NASA-EP-169] N81-23179
STS-1 Mission Assessment
[NASA-TM-82348] N81-23180
Management: A continuing bibliography with indexes
[NASA-SP-7500(15)] N81-23936

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Topology of three-dimensional separated flows
[NASA-TM-81294] N81-23037

Full-scale aerodynamic characteristics of a propellar installed on a small twin-engine aircraft wing panel
[NASA-TM-81285] N81-23039

Experimental studies of scale effects on oscillating airfoils at transonic speeds N81-23054

A solid-state digital temperature recorder for space use
[NASA-TM-81267] N81-23434

Preliminary study of head-up assessment techniques. 1: Viewing duration of instrument panel and HUD symbology using a recall methodology
[NASA-TM-78517] N81-23798

A preliminary study of head-up display assessment techniques. 2: HUD symbology and panel information search time
[NASA-TM-78536] N81-23799

A general algorithm for the construction of contour plots
[NASA-TM-81287] N81-23813

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIF.

Comparison of theoretical predictions of orbiter airloads with wind tunnel and flight test results for a Mach number of 0.52
[NASA-TM-81358] N81-23066

A comparison of laboratory measured temperatures with predictions for a spar/skin type aircraft structure
[NASA-TM-81359] N81-23067

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. EARTH RESOURCES LABS., BAY ST. LOUIS, MISS.

Multistage variable probability forest volume inventory
[E81-10140] N81-23549

Western energy related overhead monitoring project. Phase 2: Summary
[E81-10141] N81-23550

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.

On the use of off-nadir pointing for increased temporal resolution of Earth observing satellite systems
[NASA-TM-82139] N81-23175

Discovery of natural gain amplification in the 10 muon m CO2 laser bands on Mars: The first definite natural laser
[NASA-TM-82048] N81-23448

Electrical coupling between the lower atmosphere and the ionosphere N81-23520

Large-scale waves in the ionosphere observed by the AE satellite N81-23534

Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 2: Auroral optical emissions magnetic field perturbations, and plasma characteristics, measured simultaneously on the same magnetic field line
[NASA-TM-82283] N81-23743

Evaluation of magnetic helicity in homogeneous turbulence
[NASA-TM-82131] N81-23900

Documentation for the machine-readable version of an atlas of ultraviolet stellar spectra and a second atlas of ultraviolet stellar spectra from OAO 2 observations
[NASA-TM-82284] N81-23984

Documentation for the machine-readable version of the University of Michigan Catalogue of two-dimensional spectral types for the HD stars. Volume 2: Declinations minus 53 deg to minus 40 deg
[NASA-TM-82285] N81-23985

Grand unification and possible matter-antimatter domain structure in the universe
[NASA-TM-82083] N81-23986

Superrotation planetary atmospheres: Mechanical analogy, angular momentum budget and simulation of the spin up process
[NASA-TM-82137] N81-23987

On the polarity of cyclostrophic flow in planetary atmospheres
[NASA-TM-82136] N81-23990

Solar Terrestrial programs: A five year plan
[NASA-TM-82351] N81-23992

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.

Existence and uniqueness of solutions to a class of nonlinear-operator-differential equations arising in automated spaceship navigation
[NASA-TP-1860] N81-23182

Computer simulation of random variables and vectors with arbitrary probability distribution laws
[NASA-TP-1859] N81-23838

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.

Two-dimensional aerodynamic characteristics of the NACA 0012 airfoil in the Langley 8 foot transonic pressure tunnel
[NASA-TM-81927] N81-23036

Transonic flutter study of a wind-tunnel model of an arrow-wing supersonic transport
[NASA-TM-81962] N81-23071

Transonic flutter and gust-response tests and analyses of a wind-tunnel model of a torsion free wing airplane
[NASA-TM-81961] N81-23072

Description of recent changes in the Langley 6- by 28-inch transonic tunnel
[NASA-TM-81947] N81-23096

Mean-flow and turbulence measurements in the vicinity of the trailing edge of an NACA (63 sub 1)-012 airfoil
[NASA-TP-1845] N81-23410

NASA Metrology and Calibration, 1980
[NASA-CP-2174] N81-23432

An airport community noise-impact assessment model
[NASA-TM-80198] N81-23713

Report of the NASA working group on tropospheric program planning
[NASA-RP-1062] N81-23742

Energetics of a sudden stratospheric warming simulated with a three-dimensional, spectral, quasi-geostrophic model
[NASA-TP-1847] N81-23761

Effects of curved approach paths and advanced displays on pilot scan patterns
[NASA-TP-1846] N81-23791

Lateral attenuation of high-by-pass ratio engined aircraft noise
[NASA-TM-81968] N81-23862

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

A nonlinear propulsion system simulation tehnique for piloted simulators
[NASA-TM-82600] N81-23085

Traction drive for cryogenic boost pump
[NASA-TM-81704] N81-23188

Inexpensive cross-linked polymeric separators made from water soluble polymers
[NASA-TM-82619] N81-23205

Combustion system processes leading to corrosive deposits
[NASA-TM-81752] N81-23243

The fracture morphology of nickel-base superalloys tested in fatigue and creep-fatigue at 650 C
[NASA-TM-81740] N81-23244

Synergistic erosion/corrosion of superalloys in PFB coal combustor effluent
[NASA-TM-81715] N81-23245

Tribological properties and thermal stability of various types of polyimide films
[NASA-TM-81765] N81-23275

Prolonging thermal barrier coated specimen life by thermal cycle management
[NASA-TM-81742] N81-23417

Assessment of variations in thermal cycle life data of thermal barrier coated rods
[NASA-TM-81743] N81-23418

An integrated exhaust gas analysis system with self-contained data processing and automatic calibration
[NASA-TM-81592] N81-23435

NASA five-ball fatigue tester: Over 20 years of research
[NASA-TM-82589] N81-23462

MEGA16 - Computer program for analysis and extrapolation of stress-rupture data
[NASA-TP-1809] N81-23486

Lubrication fundamentals
[NASA-TM-81762] N81-23490

Response of nickel to zinc cells to electric vehicle chopper discharge waveforms
[NASA-TM-81713] N81-23608

Experimental evaluation of catalytic combustion with heat removal at near stoichiometric conditions
[NASA-TM-81748] N81-23609

Preliminary investigation of acoustic oscillations in an H2-O2 fired Hall generator
[NASA-TM-81756] N81-23610

Assessment of disk MHD generators for a base load powerplant
[NASA-TM-82609] N81-23611

The effect of minority carrier mobility variations on solar cell spectral response
[NASA-TM-82604] N81-23625

Performance of high resistivity n+pp+ silicon solar cells under 1 MeV electron irradiation
[NASA-TM-82610] N81-23626

Reduced annealing temperatures in silicon solar cells
[NASA-TM-82597] N81-23627

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

Development and testing of thermal energy storage modules for use in active solar heating and cooling systems
[NASA-TM-82415] N81-23604

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. WALLOPS FLIGHT CENTER, WALLOPS ISLAND, VA.

Research and technology developments in aeronautics, atmospheric and oceanographic measurements, radar applications, and remote sensing of insects using radar
[NASA-TM-73289] N81-23996

NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).

Some remarks on boundary layer effects on unsteady airloads N81-23050

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.

Thermal resistance measurements of a built-up roof system
[PB81-140063] N81-23332

User acceptance of an energy efficient office building, a study of the Norris Cotton Federal Office Building
[PB81-147365] N81-23335

GRIDNET
[PB81-144370] N81-23372

Calculated operating temperatures of thermally insulated electric cables
[PB81-145781] N81-23400

Examination of distance measuring devices
[PB81-147332] N81-23445

A basis for traceable NDE measurements
[PB81-145757] N81-23478

Solar energy systems: Standards for cover plates for flat plate solar collectors
[PB81-147290] N81-23709

The executives guide to data resource management
[PB81-153520] N81-23954

NATIONAL CENTER FOR SCIENTIFIC AND TECHNICAL DOCUMENTATION, BRUSSELS (BELGIUM).

Euronet and its interlinking to other networks N81-23958

NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER, BOULDER, COLO.

Solar-geophysical data number 433. Part 2: (Comprehensive Reports) Data for August 1980, July 1980, March 1980, and miscellanea
[PB81-145286] N81-23994

Solar-geophysical data number 433. Part 1: (Prompt Reports) Data for August 1980, July 1980, March 1980 and late data
[PB81-145278] N81-23995

NATIONAL INST. FOR ENVIRONMENTAL STUDIES, TSUKUBA (JAPAN).

Multielement analysis studies by flame and inductively coupled plasma spectroscopy utilizing computer-controlled instrumentation
[PB81-149528] N81-23231

NATIONAL INST. OF METROLOGY, BEIJING (CHINA).

Clock synchronization experiment via Symphonie satellite N81-23135

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ANN ARBOR, MICH.
An evaluation of climatic impact of the Niagra ice boom relative to air and water temperature and winter severity
[PB81-140931] N81-23780

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Low-level convergence and the prediction of convective precipitation in south Florida
[AD-A097553] N81-23777
Feasibility study of satellite-borne lidar global wind monitoring system, part 2
[PB81-145369] N81-23781

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SEATTLE, WASH.
Physical environment of the Eastern Bering Sea, March 1979
[PB81-148496] N81-23786

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SILVER SPRING, MD.
NOAA Meteorology Laboratory support to the Environmental Protection Agency
[PB81-149072] N81-23732

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
Method for predicting the jet-induced aerodynamics of V/STOL configurations in transition
[AD-A097356] N81-23043
Development of a water displacing, touch-up paint
[AD-A097125] N81-23288
Test methods and results of a study of greases for use in roto-launch valve lubrication
[AD-A097565] N81-23289

NAVAL AIR SYSTEMS COMMAND, WASHINGTON, D. C.
NAVAIR Avionics Master Plan
[AD-A097522] N81-23082

NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Holding capacity of plate anchors
[AD-A097116] N81-23467
Shock spectrum calculation from acceleration time histories
[AD-A097162] N81-23755

NAVAL ENVIRONMENTAL PREDICTION RESEARCH FACILITY, MONTEREY, CALIF.
Comparison of the Marine Index of refraction structure parameter, C2n, model with optical measurements
[AD-A097691] N81-23776

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
High-pressure viewports for infrared systems. Phase 1: Germanium
[AD-A097089] N81-23897

NAVAL OCEANOGRAPHY COMMAND CENTER/JOINT TYPHOON WARNING CENTER, GUAM.
Tropical cyclone forecast verification as a function of reconnaissance platform
[AD-A097454] N81-23775

NAVAL OCEANOGRAPHIC OFFICE, BAY ST. LOUIS, MISS.
The oceanographic environmental reference service retrieval program users guide
[AD-A097340] N81-23947

NAVAL OCEANOGRAPHY COMMAND DETACHMENT, ASHEVILLE, N.C.
Summary of Synoptic Meteorological Observations (SSMO), Central American coastal marine areas west coast. Volume 1: Area 1 Central Baja West, Area 2, Southwest Baja, Area 3 - Gulf of California, Area 4 - Mazatlan, Area 5 - Puerto Vallarta
[AD-A097429] N81-23774

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
ATTACK vs SCAN: A comparison of endgame aircraft survivability computer programs
[AD-A097663] N81-23076
Investigation of the use of liquid crystal thermography to study flow over turbomachinery blades
[AD-A097289] N81-23089
Microprocessor generated vertical gyrohorizon instrument for the Blue Bird simulator
[AD-A097658] N81-23098
Signal selector, spectrum receivers and touch panel control for the SATCOM signal analyzer
[AD-A097532] N81-23360
An experimental comparison of pumped superluminal electromagnetic radiation to Cerenkov radiation
[AD-A097571] N81-23361
Frequency receiver development for the satellite communications (SATCOM) signal analyzer
[AD-A097664] N81-23362
Development of the TEST UNIT for the SATCOM signal analyzer
[AD-A097666] N81-23363
Investigation of heat transfer in straight and curved rectangular ducts
[AD-A097368] N81-23422
Analytical treatment of gravity effects on gas loaded variable conductance heat pipes
[AD-A097679] N81-23629
Initial validation of an ambient air quality model for Naval air operations
[AD-A097665] N81-23715
Atmospheric optical propagation comparisons during MAGAT-80
[AD-A097274] N81-23752
Use of the TI 59 with applications to probability and statistical analysis
[AD-A097384] N81-23807
An adaptation of the ADA language for machine generated compilers
[AD-A097292] N81-23819
An investigation of several branching functions in a branch and bound algorithm for the chromatic number problem
[AD-A097330] N81-23820

NAVAL RESEARCH LAB., WASHINGTON, D. C.
Environmental effects on fatigue behavior of metals
[AD-A097546] N81-23248
Slime Analysis of painted steel panels immersed in Biscayne Bay, Miami Beach, Florida
[AD-A097229] N81-23280
Microbial deterioration of marine diesel fuel from oil shale
[AD-A097674] N81-23304
Phase synchronizing, a nonrigid, distribution transmit-receive radar antenna array
[AD-A097486] N81-23359
Minimum-cross-entropy spectral analysis of multiple signals
[AD-A097531] N81-23384
Application of ion implantation for the improvement of localized corrosion resistance of M50 steel bearings
[AD-A097230] N81-23466
DNA/PLACES, barium event JAN: Quick-look field report of 'in situ' probe measurements
[AD-A097227] N81-23751
Drag enhancement of microbial slime films on rotating discs
[AD-A097228] N81-23787
Particle simulation code for longitudinal dynamics of heavy ion beams
[LBL-12205] N81-23910

NAVAL SURFACE WEAPONS CENTER, WHITE OAK, MD.
Hot spot initiation patterns in shocked explosives and propellants recorded by thermal film
[AD-A097088] N81-23305

NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
A numerical treatment of the dynamic motion of a zero bending rigidity cylinder in a viscous stream
[AD-A097450] N81-23426

NEW MEXICO STATE UNIV., LAS CRUCES.
Soils of Israel and their similarity to soils of the United States
[AD-A097528] N81-23564

NEW YORK UNIV., N. Y.
Unsteady transonic flow past airfoils in rigid body motion
[AD-A097142] N81-23041

NIELSEN ENGINEERING AND RESEARCH, INC., MOUNTAIN VIEW, CALIF.
Calculation of two-dimensional inlet flow fields by an implicit method including viscous effects: User's manual
[NASA-CR-3412] N81-23027
A study of real jet effects on the surface pressure distribution induced by a jet in a crossflow
[NASA-CR-166150] N81-23029

NORTH ATLANTIC TREATY ORGANIZATION, BRUSSELS (BELGIUM).
Characteristics, performances and testing capabilities of four main European subsonic wind-tunnels (RAE-5- m, ONERA FL and SIMA, DNW)
[AC/243(CC)D/12] N81-23094

NORTH CAROLINA STATE UNIV., RALEIGH.
An investigstion of the effects of mutual coupling on the performance of microstrip radiation
[AD-A097556] N81-23383

NORTH CAROLINA UNIV. AT CHAPEL HILL.
Distances of random variables and point processes
[AD-A097621] N81-23627

NORTH DAKOTA UNIV., GRAND FORKS.
Evaluation of hydrothermal resources of North Dakota, phase 1
[DOE/ID-12030/12] N81-23568

NORTHEASTERN UNIV., BOSTON, MASS.
The role of microcomputers in trace metal analysis N81-23198
Amorphous and microcrystalline thin films of iron-base alloys for corrosion resistant coatings N81-23235
Suppression of narrowband interference in pseudo-noise spread spectrum systems
[AD-A097336] N81-23368

NORTHROP CORP., HAWTHORNE, CALIF.
Fatigue degradation in compressively loaded composite laminates
[NASA-CR-165681] N81-23192

NORTHWESTERN UNIV., EVANSTON, ILL.
Studies of metal: Semiconductor interfaces in catalysis and energy conversion
[COO-4946-3] N81-23262

NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT, KJELLER.
The physics of radio wave absorption N81-23515

NORWEGIAN TELECOMMUNICATIONS ADMINISTRATION RESEARCH ESTABLISHMENT, KJELLER.
Propagation effects in high latitudes N81-23132

O

OAK RIDGE ASSOCIATED UNIVERSITIES, TENN.
Global energy consumption and production in 2000
[ORAU/IEA-81-2(M)] N81-23642

OAK RIDGE NATIONAL LAB., TENN.
Monte Carlo simulation of an ac tual segmented calorimeter: A study of calorimeter performance at high energies
[ORNL/TM-7123] N81-23443
Residential energy use and conservation actions: Analysis of disaggregate household data
[ORNL/CON-68] N81-23686
Environmental issues and site selection criteria for small hydropower projects in developing countries
[ORNL/TM-7620] N81-23720
US Department of Energy environmental compliance program handbook: Federal regulations on air quality, fossile energy
[ORNL/EIS-176] N81-23727
Method for sampling from fission neutron energy spectra
[ORNL/TM-7631] N81-23884
Ion extraction and optics in three dimensions
[ORNL/TM-7691] N81-23899
Experimental investigation of solid hydrogen pellet ablation in high-temperature plasmas using holographic interferometry and other diagnostics
[ORNL/TM-7486] N81-23905
Tensor pressure Tokamak equilibrium and stability
[ORNL/TM-7120] N81-23906

OAK RIDGE Y-12 PLANT, TENN.
Materials for high-temperature hydrogen fluorine environments
[Y-2201] N81-23191
Rockwell-Rocketdyne flywhell test results
[Y/DX-244] N81-23697

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Introduction of unsteady boundary layer effects in two dimensional transonic calculation N81-23051

OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
International Union of Theoretical and Applied Mechanics: 3rd Symposium on Creep in Structures [AD-A097420] N81-23494
OHIO STATE UNIV., COLUMBUS.
The development of two novel spectroelectrochemical techniques N81-23203
Bioelectrocatalysis using chemically modified electrodes N81-23204
Gaseous sulfidation of pure molybdenum at 700 deg - 950 deg C N81-23239
Solid-state displacement reactions between iron and nickel oxide at 1000 C N81-23240
Hydrogen attack of pressure-vessel steel [DOE/ER-02872/5] N81-23258
Electromagnetic scattering by open circular waveguides N81-23339
Immittance properties of large finite dielectric covered phased arrays N81-23341
Research on near field pattern effects [AD-A097102] N81-23353
The use of microwaves to characterize optically stimulated semiconductors N81-23374
A hybrid method which combines a moment method current with an asymptotic current N81-23377
Combined radiation and conduction in a nongray participating medium that absorbs, emits, and anisotropically scatters N81-23406
Atmospheric microwave refractivity and refraction [NASA-CR-164339] N81-23739
The CTS 11.7 GHz angle of arrival experiment [NASA-CR-164338] N81-23740
Terms and axioms for a theory of human-machine systems N81-23796
The design of computer based integrated information displays N81-23942
OKLAHOMA GAS AND ELECTRIC CO., OKLAHOMA CITY.
Performance monitoring of ground-coupled solar-assisted heat pump systems [EPRI-EM-1697] N81-23696
OKLAHOMA STATE UNIV., STILLWATER.
Performance monitoring of ground-coupled solar-assisted heat pump systems [EPRI-EM-1697] N81-23696
OKLAHOMA UNIV., NORMAN.
Comparison of the climates of selected locations in the United States with the climate of Beersheba, Israel [AD-A097529] N81-23767
OLD DOMINION UNIV., NORFOLK, VA.
Investigation of aerodynamic characteristics of wings having vortex flow using different numerical codes [NASA-CR-165706] N81-23034
Extension of oblique incidence method to photo-orthotropic-elasticity [NASA-CR-164334] N81-23492
Feasibility study of a microprocessor based oculometer system [NASA-CR-164286] N81-23889
Modeling of thin-film GaAs growth [NASA-CR-164317] N81-23926
OREGON STATE UNIV., CORVALLIS.
Fluid forces on smooth and rough circular cylinders N81-23402
Experimental studies of partially defluidized bed with immersed heat exchange tubes N81-23407
OSLO UNIV. (NORWAY).
Dynamics of the dayside cusp aurora N81-23533
OTAGO UNIV., DUNEDIN (NEW ZEALAND).
First results from the Tromsoe ionospheric modification facility N81-23521

P

PATTERN ANALYSIS AND RECOGNITION CORP., ROME, N. Y.
Data collection analysis and test [AD-A097160] N81-23948
PENNSYLVANIA STATE UNIV., STATE COLLEGE.
The boundary layer on compressor cascade blades [NASA-CR-164330] N81-23416
PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Dynamic burning effects in the combustion of solid propellants with cracks, and the use of granular bed combustion models [AD-A097474] N81-23302
Machining with a round-nosed form tool N81-23457
Microstructural effects on the mechanical properties and thermal shock resistance of a high alumina refractory concrete N81-23479
Ultimate limits to error probabilities for ionospheric models based on solar geophysical indices and how these compare with the state of the art N81-23538
Crystallite sizes in polyethylene single crystals and melt-crystallized polyethylene samples N81-23923
PENNSYLVANIA UNIV., PHILADELPHIA.
Embrittlement of high-strength steels: Effects of impurities and hydrogen N81-23236
Synthesis and properties of highly conducting derivatives of polyacetylene, polyparaphenyleneand graphite N81-23274
The bonding of H to Ni, Pd and Pt surfaces [AD-A097361] N81-23276
Signal processing in an uncertain environment: Multivariate techniques of nonparametric and robust detection N81-23336
Interference cancellation in self-cohering arrays N81-23337
Degradation of the performance of communication systems in the presence of interference [AD-A097685] N81-23369
Fault analysis of analog electronic systems: Algorithms based on fuzzy sets N81-23373
Analysis and evaluation in the production process and equipment area of the low-cost solar array project [DOE/JPL-954796-81/12] N81-23622
PHILIPS LABS., BRIARCLIFF MANOR, NEW YORK.
Development of a novel laser material for miniaturized laser systems [AD-A097477] N81-23451
PHILIPS TELECOMMUNICATION INDUSTRIES, HILVERSUM (NETHERLANDS).
Single Channel Per Carrier (SCPC) scheme: Delta modulation. Experimental Results N81-23119
PHYSICAL SCIENCES, INC., WOBURN, MASS.
Pulverized fuel combustion: Modeling and scaleup mathodologies [DOE/PC-30294/1] N81-23219
Effects of preignition on pulverized coal combustion [DOE/PC-30293/1] N81-23312
POLITECNICO DI MILANO (ITALY).
Experiments on a turbulent unsteady boundary layer with separation N81-23057
PORTLAND CEMENT ASSOCIATION, SKOKIE, ILL.
Coupled walls in earthquake-resistant buildings, modeling techniques and dynamic analysis [PB81-132698] N81-23329
POST AND TELEGRAPH OF INDIA, NEW DELHI.
Single Channel Per Carrier (SCPC) scheme for remote area telephony N81-23118
Integration of satellite circuits in the terrestrial telecommunication network N81-23121
Television with multiple audio facility using time division multiplexing N81-23130
PRATT AND WHITNEY AIRCRAFT GROUP, EAST HARTFORD, CONN.
Fuel/engine/airframe trade off study [AD-A097391] N81-23073
PRINCETON UNIV., N. J.
An assessment of theoretical models for viscous and transonic flow N81-23046
High-field effects in metal-aluminum oxide-silicon capacitors N81-23378
Compressible turbulent boundary layer interaction experiments [NASA-CR-164292] N81-23415
Impact and penetration problems [AD-A097413] N81-23463
The estimation of palaeomagnetic pole positions [AD-A097488] N81-23745
The interaction of statistics and geology - finite deformations [AD-A097463] N81-23746
Partial characterizations of completely nondeterministic stochastic processes [AD-A097514] N81-23844
Three aspects of the statistics of directions [AD-A097489] N81-23845
The Fisher-Bingham distribution on the sphere [AD-A097475] N81-23846
Distributions on the circle and sphere [AD-A097462] N81-23847
Antipodally symmetric distributions for orientation statistics [AD-A097460] N81-23848
Virtual photoproduction of hidden and open charm [LBL-11844] N81-23870
Limiting beta of stellarators with no net current [PPPL-1738] N81-23913
PURDUE UNIV., LAFAYETTE, IND.
Effects of internal gas pressure and microstructure on the mechanisms of hot pressing and swelling in ceramics [COO-2713-5] N81-23293
An experimental and numerical comparison of turbulent flow over a step [AD-A097141] N81-23420
Empirical Bayes rules for selecting good populations [AD-A097619] N81-23843
Integral tests of fast neutron dosimetry cross sections [EPRI-NP-1658] N81-23876
Quantitative measurements in laser-induced plasmas using optical probing [COO-4001-8] N81-23912

R

RADIATION MONITORING DEVICES, INC., WATERTOWN, MASS.
High efficiency thin film CdTe solar cells [SERI/PR-9133-1-T1] N81-23641
Low cost sprayed CdTe solar cell research [SERI/PR-8104-3-T1] N81-23659
RAND CORP., SANTA MONICA, CALIF.
Economic implications of regulating nonaerosol chlorofluorocarbon emission: An executive briefing [PB81-146698] N81-23735
Flexible urethane foams and chlorofluorocarbon emissions: A support document for economic implications of regulating chlorofluorocarbon emissions from nonaerosol applications [PB81-146706] N81-23736
RENSSELAER POLYTECHNIC INST., TROY, N. Y.
Chemical diffusion on solid surfaces [COO-4220-4] N81-23224
Localized corrosion and stress-corrosion cracking behavior of stainless steel weldments [DOE/ER-02462/T1] N81-23261
RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N. C.
Asbestos analytical programs bulk sample analysis: New York City and Maryland [PB81-146722] N81-23729
RICE UNIV., HOUSTON, TEX.
Uncertainty measurement in a complex task as a function of response mode and event type characteristics [AD-A097678] N81-23792
RKL CONTROLS CO., LUMBERTON, N.J.
Solar heating and cooling system installed at RKL Controls Company, Lumberton, New Jersey [NASA-CR-161679] N81-23597
ROCKWELL INTERNATIONAL CORP., ANAHEIM, CALIF.
Thin films of InP for photovoltaic energy conversion [COO-3004-4] N81-23632
ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF.
Molten salt coal gasification process development unit, phase 2 [DOE/ET-10296/70] N81-23310
Satellite Power Systems (SPS) concept definition study, exhibit F [NASA-CR-161750] N81-23599
Financial study of commercialization of solar central receiver power systems [DOE/SF-11421/1] N81-23640
ROCKWELL INTERNATIONAL CORP., COLUMBUS, OHIO.
Design, development, and evaluation of lightweight hydraulic system, phase 1 [AD-A097505] N81-23075
ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Satellite Power Systems (SPS) concept definition study (Exhibit D). Volume 7: System/subsystems requirements databook [NASA-CR-3399] N81-23595

ROCKWELL INTERNATIONAL CORP., RICHLAND, WASH.
Oregon-based activities in support of the Basalt Waste Isolation Project
[RHO-BWI-SA-42] N81-23880
ROCKWELL INTERNATIONAL CORP., THOUSAND OAKS, CALIF.
Development of polycrystal GaAs solar cells
[SERI/PR-8032-1-T1] N81-23660
ROCKWELL INTERNATIONAL SCIENCE CENTER, THOUSAND OAKS, CALIF.
Study program for encapsulation materials interface for low-cost solar array
[NASA-CR-164328] N81-23619
ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
Access protocol for a parallel wideband local digital communication network - proposed standard
[AD-A097354] N81-23357
Wavelength division multiplexing: Overview of the state of the art
[AD-A097587] N81-23896
ROME RESEARCH CORP., N. Y.
Reconnaissance Sensor System exploitation
[AD-A097224] N81-23567
ROYAL AIRCRAFT ESTABLISHMENT, BEDFORD (ENGLAND).
Oscillatory flows from shock induced separations on biconvex aerofoils of varying thickness in ventilated wind tunnels N81-23056
ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
Experimental flutter at high subsonic speeds and its theoretical prediction, taking into account wing thickness and Reynolds number N81-23052
Use of external information services N81-23960
RUHRKOHLE A.G., ESSEN (WEST GERMANY).
Flameproof television camera set for the observation of coal seams and rock strata as well as of tectonic surfaces in underground boreholes
[BMFT-FB-T-80-149] N81-23370
RUST ENGINEERING CO., BIRMINGHAM, ALA.
Advanced system demonstration for utilization of biomass as an energy source, executive summary
[DOE/ET-20055/T3-EXEC-SUMM] N81-23596
Advanced system demonstration for utilization of biomass as an energy source. Site study report
[DOE/ET-20055/T1] N81-23662
Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3, book 2: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-2] N81-23666
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668
RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N. J.
Kinetic theory and turbulent discontinuities
[NASA-CR-164267] N81-23413

S

SANDERS ASSOCIATES, INC., NASHUA, N. H.
High temperature solar receiver
[NASA-CR-164332] N81-23614
SANDIA LABS., ALBUQUERQUE, N. MEX.
Physical and mechanical properties of cast 17-4 PH stainless steel
[SAND-80-2302] N81-23260
Glass ceramics for sealing to high-thermal-expansion metals
[SAND-80-2192] N81-23297
Experimental investigations of certain side reactions and the initial voltage transient for FeS2 cathodes in thermal batteries
[SAND-80-2341] N81-23399
Photoferroelectric image storage in PLZT ceramics
[AD-A097448] N81-23437
Midtemperature solar systems test facility predictions for thermal performance based on test data: Solar kinetics T-600 solar collector with FEK 244 reflector surface
[SAND-80-1964/9] N81-23675
Preliminary analysis of two aspects of magma-powered electric-generation plants
[SAND-80-1522] N81-23687
Solar enhanced oil recovery: A potential early market for industrial solar energy
[SAND-80-1869C] N81-23702
The Coolidge Solar Irrigation Project
[SAND-80-2378] N81-23705
Lagrangian measurement platform flights in support of the Tennessee Plume Study: Field effort and data
[SAND-79-1336] N81-23717
Long-term measurements of ground motions offshore
[SAND-80-2718C] N81-23756
CDC/1000: A Control Data Corporation remote batch terminal emulator for Hewlett-Packard minicomputers
[SAND-80-2548] N81-23811
Optimization of a high-voltage plasma focus machine
[SAND-81-6005] N81-23909
SCIENCE AND EDUCATION ADMINISTRATION, WESLACO, TEX.
Plant cover, soil temperature, freeze, water stress, and evapotranspiration conditions
[E81-10130] N81-23543
SCIENCE APPLICATIONS, INC., CANOGA PARK, CALIF.
Multiple-scale turbulence modeling of boundary layer flows for scramjet applications
[NASA-CR-3433] N81-23411
SCIENCE APPLICATIONS, INC., MCLEAN, VA.
Cost effective flat plate photovoltaic modules using light trapping
[NASA-CR-164320] N81-23617
SCIENCE RESEARCH COUNCIL, SLOUGH (ENGLAND).
Ionospheric predictions for HF radio systems: The future N81-23537
SCIENTIFIC RESEARCH ASSOCIATES, INC., GLASTONBURY, CONN.
Analysis of turbulent flow about an isolated airfoil using a time dependent Navier-Stokes procedure N81-23053
SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Availability of copper, nickel, cobalt and manganese from ocean ferromanganese nodules (3)
[PB81-145971] N81-23747
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, summer, 1978
[AD-A097134] N81-23749
Geological factors related to characteristics of seafloor manganese nodule deposits
[PB81-145831] N81-23758
SHAKER RESEARCH CORP., BALLSTON LAKE, N. Y.
Laboratory investigation of water-lubricated elastomeric bearings
[AD-A097109] N81-23464
SHANGHAI OBSERVATORY (CHINA).
A time comparison experiment between Shangai and Paris via Symphonie satellite N81-23136
SHOCK AND VIBRATION INFORMATION CENTER (DEFENSE), WASHINGTON, D. C.
The Shock and Vibration Digest, volume 13, no. 4
[AD-A097950] N81-23483
SLOVAK ACADEMY OF SCIENCES, BRATISLAVA (CZECHOSLOVAKIA).
Vibration of curved beams N81-23484
SOCIETE ANONYME D'ETUDES ET REALISATIONS NUCLEAIRES, LIMEIL-BREVANNES (FRANCE).
The attitude sensors on Symphonie and their subsequent development N81-23165
SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, CANNES (FRANCE).
Thermal control of Symphonie N81-23166
SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, LES MUREAUX (FRANCE).
The Symphonie space segment N81-23105
SOCIETE TOULOUSAINE D'ETUDES ET REALISATIONS ELECTRONIQUES ET MECANIQUES, CASTANET (FRANCE).
Step tracking system N81-23141
SOLAREX CORP., ROCKVILLE, MD.
A Module Experimental Process System Development Unit (MEPSDU)
[NASA-CR-164325] N81-23616
SONICRAFT, INC., CHICAGO, ILL.
Atmospheric transmittance/radiance computer code FASCOD2
[AD-A097593] N81-23893
SOUTHERN CALIFORNIA EDISON CO., ROSEMEAD.
Test and evaluation of methanol in a gas turbine system
[EPRI-AP-1712] N81-23307
SOUTHERN METHODIST UNIV., DALLAS, TEX.
Efficient spectrum utilization in mobile radio communication systems N81-23338
SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
STRAP: Steam Turbine Rotor Analysis Program. Part 1: General information manual
[EPRI-NP-1687-PT-1] N81-23469
SPECTRON DEVELOPMENT LABS., INC., COSTA MESA, CALIF.
Particulate processes in pulverized coal flames
[DOE/PC-30300/T2] N81-23218
SPIRE CORP., BEDFORD, MASS.
Demonstration of Pulsed Electron Beam Applications (PEBA) for fabricating small geometry semiconductor devices
[AD-A097547] N81-23382
Semiconductor processing by electron beam pulse-induced surface reactions
[PB81-148579] N81-23401
SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Thermochemistry of gaseous compounds of metals
[AD-A097352] N81-23210
Response of a plain and filled elastomer (Solithane 113) to high strain-rate compression, shear, and tension loading
[AD-A097455] N81-23278
Assessing the representativeness of ozone monitoring data
[PB81-146995] N81-23730
Research on parallelism in problem-solving systems
[AD-A097608] N81-23805
Quantitative absorption and fluorescence studies of NO between 1060 and 2000 A
[NASA-CR-164340] N81-23867
STANDARD ELEKTRIK LORENZ A.G., STUTTGART (WEST GERMANY).
Experimental operation of a digital video transmission system N81-23127
Tests and results of integrated TV sound transmission N81-23129
STANFORD UNIV., CALIF.
On source radiation
[NASA-CR-166176] N81-23343
Application of holography to the study of helicopter rotor flow fields
[NASA-CR-164293] N81-23433
On certain integrals which pertain to the forced vibration of plates
[NASA-CR-166175] N81-23488
Binary integer linear programming: A hybrid implicit enumeration approach
[AD-A097108] N81-23817
QP-based methods for large-scale nonlinearly constrained optimization
[AD-A097407] N81-23830
A new proof of admissibility of tests in the multivariate analysis of variance
[AD-A097110] N81-23840
Asymptotic power of EDF statistics for exponentiality against Weibull and Gamma alternatives
[AD-A097107] N81-23841
Brownian approximations to first passage probabilities
[AD-A097106] N81-23842
A note on sound radiation into a uniformly flowing fluid
[NASA-CR-166177] N81-23861
Synchrotron emissivity from mildly relativistic particles
[NASA-CR-164335] N81-23868
High magnetic field MHD generator program
[DOE/ET-15611/3] N81-23902
STATE UNIV. OF NEW YORK, STONY BROOK.
Multiphoton dissociation spectroscopy and photochemistry
[DOE/ER-10660/1] N81-23225
Chemical reaction and turbulence
[DOE/ER-10439/2] N81-23226

STATE UNIV. OF NEW YORK AT BUFFALO.
Free torsional vibrations of a hollow cylinder with laminated periodic structure
[AD-A097163] N81-23496
Strain-dependent creep damage in random inhomogeneous materials
[AD-A097164] N81-23497
A general inverse solution for 2D edge waves
[AD-A097683] N81-23748
STATE UNIV. OF NEW YORK AT STONY BROOK.
Application of PIXE, RBS and high energy proton microbeams to the elemental analysis of coal and coal waste
[BNL-28668] N81-23228
Microscopic approach to transport in two-phase random media N81-23408
STERLING HOBE CORP., WASHINGTON, D.C.
Market study for direct utilization of geothermal resources by selected sectors of economy
[DOE/RA-50108/T1] N81-23631
STUTTGART UNIV. (WEST GERMANY).
Study of a temperature-stabilized heat pipe system with electrical feedback
[IKE-5-196] N81-23649
SUSSEX UNIV., BRIGHTON (ENGLAND).
Response of nonlinear mechanical systems to random excitation. Part 1: Markov methods N81-23485
SWEDISH COUNCIL FOR BUILDING RESEARCH, STOCKHOLM.
The finite element method for sheet metal structures - development of a computer program
[PB81-135725] N81-23330
Stressed skin action in composite panels comprising steel sheeting and boards
[PB81-135733] N81-23331
SYRACUSE UNIV., N. Y.
A study of integrated switching techniques
[AD-A097243] N81-23806
SYSTEM PLANNING CORP., ARLINGTON, VA.
Materials processing threshold report. 1: Semiconductor crystals for infrared detectors
[NASA-CR-161752] N81-23100
SYSTEMS AND APPLIED SCIENCES CORP., HAMPTON, VA.
SUMS preliminary design and data analysis development
[NASA-CR-165696] N81-23181
SYSTEMS CONTROL, INC., PALO ALTO, CALIF.
System integration issues of residential solar photovoltaic systems
[DOE/RA-29349/01] N81-23643
Introduction of electric vehicles into the utility system: Analysis of research needs
[EPRI-EM-1716] N81-23978
SYSTEMS RESEARCH LABS., INC., DAYTON, OHIO.
A human operator gunner model for a tracking task with interrupted observations in an antiaircraft artillery system
[AD-A097360] N81-23803
SYSTEMS TECHNOLOGY, INC., HAWTHORNE, CALIF.
Multi-rate digital control systems with simulation applications. Volume 1: Technical report
[AD-A097549] N81-23825
Multi-rate digital control systems with simulation applications. Volume 2: Computer algorithms
[AD-A097550] N81-23826

T

TECHNICAL RESEARCH ANALYSIS CO., FALLS CHURCH, VA.
Development of a market methodology for assessing the impact of solar thermal-produced fuels and chemicals
[DOE/SF-12989/1] N81-23968
TECHNION - ISRAEL INST. OF TECH., HAIFA.
Microstructural changes following superplastic deformation of commercially pure titanium
[AD-A097277] N81-23247
TECHNISCHE HOCHSCHULE, DARMSTADT (WEST GERMANY).
Ionospheric disturbances of magnetospheric origin N81-23512
TECHNISCHE UNIV., BERLIN (WEST GERMANY).
Acceptance and operation of small receiving stations in urban areas N81-23137
Measuring skin friction with Preston tubes in boundary-layer flows with additional parameters
[ISSN-0077-5606] N81-23412
TECHNOLOGY, INC., DAYTON, OHIO.
Structural Integrity Recording System (SIR) for U.S. Army AH-1G Helicopters
[AD-A097283] N81-23438
TECHNOLOGY REPORTS CENTRE, ORPINGTON (ENGLAND).
Introduction of on-line searching in information services N81-23962
TECHNOLOGY SERVICE CORP., SANTA MONICA, CALIF.
Sensor image prediction techniques
[AD-A097638] N81-23895
TEL-AVIV UNIV. (ISRAEL).
Finite elements for fluid dynamics
[AD-A097215] N81-23424
TELEDIFFUSION DE FRANCE, PLEUMEUR-BODOU.
Analog television and radio transmission experiments N81-23126
TELEDYNE BROWN ENGINEERING, HUNTSVILLE, ALA.
Software partitioning schemes for advanced simulation computer systems, part 1
[AD-A096187] N81-23818
TELESIS LAB., CHILLICOTHE, OHIO.
Microprocessor control of a ground water heat pump
[DOE/R5-10149/2] N81-23658
TELIC CORP., SANTA MONICA, CALIF.
Cadmium sulfide/copper sulfide heterojunction cell research by sputter deposition
[TELIC-80-3] N81-23661
TENNESSEE UNIV., KNOXVILLE.
Methods and formulas for determining the integral nonlinearity of solid-state amplifiers N81-23379
Interaction of slow electrons with high-pressure gases (quasi-liquids): Synthesis of our knowledge on slow electron-molecule interactions
[DOE/EV-04703/T1] N81-23875
TEXAS A&M UNIV., COLLEGE STATION.
Composite materials for structural design
[AD-A097297] N81-23195
New type of metallo-organic polymer: Bimetalloporphyrins. Investigating a new chemistry of metallophthalocyanines
[AD-A097447] N81-23286
A nonlinear analysis of liquid sloshing in rigid containers
[PB81-135204] N81-23430
Dryland pasture and crop conditions as seen by HCMM
[E81-10131] N81-23544
Basic research planning in mathematical pattern recognition and image analysis
[NASA-CR-160946] N81-23561
Three-body helicity formalism applied to pion-deuteron scattering
[DOE/ER-05223/31] N81-23874
TEXAS UNIV. AT ARLINGTON.
Quasi-optical techniques for millimeter and submillimeter-wave circuits
[AD-A097355] N81-23388
TOULOUSE UNIV. (FRANCE).
Plasma instabilities in the electrojets N81-23532
TRANSPORTATION SYSTEMS CENTER, CAMBRIDGE, MASS.
General Aviation Activity and Avionics Survey
[AD-A097604] N81-23081
TRC ENVIRONMENTAL CONSULTANTS, INC., WETHERSFIELD, CONN.
Meteorological and air quality data report. WIPP site: Eddy County, New Mexico
[SAND-81-7052] N81-23779
TROMSOE UNIVERSITY (NORWAY).
First results from the Tromsoe ionospheric modification facility N81-23521
Dynamics of the dayside cusp aurora N81-23533
TRONDHEIM UNIV. (NORWAY).
Survey of solutions to the delivery problems. Growth control of library collections N81-23963
TRW DEFENSE AND SPACE SYSTEMS GROUP, REDONDO BEACH, CALIF.
Coal combustion aerothermochemistry research
[DOE/ER-10029/T1] N81-23216
The 403 MHz SAW oscillator
[AD-A097675] N81-23387
Laser assisted semiconductor device processing
[AD-A097427] N81-23452
KrF laser fusion: Perform optical systems study of direct short pulse extraction
[DOE/DP-40069/3] N81-23454
High power ICRH experiments on the Wisconsin levitated octupole
[DOE/ET-53051/15] N81-23903
TRW, INC., MCLEAN, VA.
Coalbed methane production case histories
[DOE/METC-08089/115] N81-23309
TRW ENERGY SYSTEMS PLANNING DIV., MCLEAN, VA.
Characterization of alternative electric generation technologies for the SPS comparative assessment. Volume 1: Summary of central station technologies
[ANL/EES-TM-121-VOL-1] N81-23669
Characterization of alternative electric generation technologies SPS comparative assessment. Volume 2: Central-station technologies
[ANL/EES-TM-121-VOL-2] N81-23670

U

UNION CARBIDE CORP., OAK RIDGE, TENN.
Materials for high-temperature hydrogen fluorine environments
[AD-A097426] N81-23190
Program to discover materials suitable for service under hostile conditions obtaining in equipment for the gasification of coal and other solid fuels
[FE-1784-69] N81-23253
UNION OIL CO. OF CALIFORNIA, BREA.
Ethanol fuel modification for highway vehicle use
[ALO-3683-T1] N81-23306
UNION OIL CO. OF CALIFORNIA, LOS ANGELES.
Fuel/engine/airframe trade off study
[AD-A097391] N81-23073
UNITED NATIONS, NEW YORK, N. Y.
Symphonie experiments and future applications of telecommunications satellites for the United Nations network N81-23158
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION, PARIS (FRANCE).
The experimental use of the Symphonie satellite during the 19th session of the General Conference - UNESCO N81-23157
UNITED TECHNOLOGIES CORP., EAST HARTFORD, CONN.
Performance deterioration based on simulated aerodynamic loads test, JT9D jet engine diagnostics program
[NASA-CR-165297] N81-23086
UNITED TECHNOLOGIES CORP., SOUTH WINDSOR, CONN.
Molten carbonate fuel cell system verification and scale-up
[EPRI-EM-1481] N81-23651
UNIVERSITY COLL. OF WALES, ABERYSTWYTH.
Prediction techniques for forthcoming solar maxima N81-23536
UNIVERSITY OF SOUTH FLORIDA, TAMPA.
Preconcentration methods for the determination of gaseous sulfur compounds in air N81-23710
UNIVERSITY OF SOUTHEASTERN MASSACHUSETTS, NORTH DARTMOUTH.
Note on computer graphics for maximum entropy spectral analysis
[AD-A097121] N81-23822
UTAH STATE UNIV., LOGAN.
Modelling the high-latitude ionosphere N81-23514
Ionospheric composition: The seasonal anomaly explained N81-23523
Energetic 0-positive precipitation: A significant energy N81-23527
UTAH UNIV., SALT LAKE CITY.
A theoretical study of turbulence in terms of conditioned variables N81-23405
Indentifying environmental features for land management decisions
[E81-10142] N81-23551
RAWINPROC: Computer program for decommutating, interpreting, and interpolating Rawinsonde meteorological balloon sounding data
[NASA-CR-164315] N81-23766
Development of infrared and microwave techniques for cloud parameter inference from satellite imagery and sounder data
[AD-A097592] N81-23770

V

VARIAN ASSOCIATES, PALO ALTO, CALIF.
Materials for high efficiency monolithic multigap concentrator solar cells
[SERI/TR-8081-1-T3] N81-23646

VARTA BATTERIE A.G., KELKHEIM (WEST GERMANY).
Development of a lead-acid battery with high energy and power density
[BMFT-FB-T-80-151] N81-23653

VEDA, INC., CAMARILLO, CALIF.
Economic analysis of the unified heliostat array
[DOE/SF-10802/1] N81-23657

VEREINIGTE FLUGTECHNISCHE WERKE-FOKKER G.M.B.H., BREMEN (WEST GERMANY).
Introductory remarks on boundary layer effects on unsteady airloads N81-23045

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Creep and creep rupture of laminated graphite/epoxy composites
[NASA-CR-164297] N81-23193
A fundamental approach to adhesion: Synthesis, surface analysis, thermodynamics and mechanics
[NASA-CR-164229] N81-23489
Design optimization in underground coal systems. Volume 6: LHDSIM: A load-haul-dump simulator for room-and-pillar mining systems
[FE-1231-24-VOL-6] N81-23569
Design optimization in underground coal systems. Volume 9: Modified FACESIM and COST-SCHED programs
[FE-1231-27-VOL-9] N81-23574
Design optimization in underground coal systems. Volume 3: Structural characterization of coal
[FE-1231-21-VOL-3] N81-23575
Design optimization in underground coal systems. Volume 7: Prediction of mining subsidence and related parameters over longwall mining operations
[FE-1231-25] N81-23576
CdSiAs2 thin films for solar cell applications
[SERI-9143] N81-23683
CdSiAs2 films for solar cell applications
[SERI-9143] N81-23684

VIRGINIA UNIV., CHARLOTTESVILLE.
Use of second order stochastic dominance in decision aiding
[AD-A097117] N81-23849
Glow discharge as an atomization and ionization device
[DOE/ER-10635/T1] N81-23911
On sensitivity analysis in systems for planning and decision support
[AD-A097409] N81-23940
Multiple objective evaluation and choicemaking under risk with partial preference infomation
[AD-A097418] N81-23941

W

WASHINGTON STATE UNIV., PULLMAN.
The emission of electrons and positive ions from fracture of materials
[AD-A097390] N81-23194

WASHINGTON UNIV., SEATTLE.
A difference in efficiency between synchronous and asynchronous systems
[AD-A097476] N81-23381
Impacted notch bend specimen
[AD-A097131] N81-23495

WAYNE STATE UNIV., DETROIT, MICH.
Rheology, flow and atomization of coal-oil mixtures N81-23404
Tolerance of the head and neck to -G sub x inertial loading of the head
[AD-A097632] N81-23789

WEST VIRGINIA UNIV., MORGANTOWN.
Analysis of the structural parameters that influence gas production from the Devonian shale, volume 1
[DOE/ET-12138/T1-VOL-1] N81-23318
Coal gasification availability analysis
[PB81-153272] N81-23321

WESTERN UNION TELEGRAPH CO., MCLEAN, VA.
The 30/20 GHz communications system functional reqirements
[NASA-CR-165301] N81-23347

WESTINGHOUSE ELECTRIC CORP., EAST PITTSBURGH, PA.
Economic assessment of advanced central-receiver solar-thermal power system. Executive summary
[DOE/SF-10601/T1] N81-23680
Economic assessment of advanced central-receiver solar-thermal power systems
[DOE/SF-10601/1] N81-23681
Economic assessment of advanced central-receiver solar-thermal power systems: PG and E assessment
[DOE/SF-10601/2] N81-23682

WESTINGHOUSE ELECTRIC CORP., LESTER, PA.
The 100 MWe OTEC alternate power systems. Volume 2: Appendices
[ORO-1473-T1-VOL-2-1] N81-23392

WESTINGHOUSE ELECTRIC CORP., PITTSBURGH, PA.
MOD-OA 200 kW wind turbine generator engineeringing
[NASA-CR-165129] N81-23598
Design, fabrication, and bench testing of a solar chemical receiver
[NASA-CR-164333] N81-23620
Photovoltaic utility/customer interface study
[SAND-80-7061] N81-23678

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER, PITTSBURGH, PA.
Silicon materials task of the low-cost solar array project. Phase 4: Effects .. impurities and processing on silicon solar cells
[NASA-CR-164331] N81-23613

WHEELABRATOR CLEANFUEL CORP., WASHINGTON, D.C.
Advanced system demonstration for utilization of biomass as an energy source. Site study report
[DOE/ET-20055/T1] N81-23662
Advanced system demonstration for utilization of biomass as an energy source. Volume 1: Scope and design criteria and project summary
[DOE/ET-20055/T2-VOL-1] N81-23663
Advanced systems demonstration for utilization of biomass as an energy source. Volume 2: Technical specifications
[DOE/ET-20055/T2-VOL-2] N81-23664
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-1] N81-23665
Advanced systems demonstration for utilization of biomass as an energy source. Volume 3, book 2: Equipment specifications
[DOE/ET-20055/T2-VOL-3-BK-2] N81-23666
Advanced system demonstration for utilization of biomass as an energy source. Volume 4: Design drawings
[DOE/ET-20055/T2-VOL-4] N81-23667
Advanced system demonstration for utilization of biomass as an energy source. Executive summary
[DOE/ET-20055/T4-EXEC-SUMM] N81-23668

WISCONSIN UNIV. - MADISON.
Correction for loss effects in valence-band XPS spectra by deconvolution
[AD-A097598] N81-23209
Thermal analysis of malleable base white iron for quality control N81-23237
Optimum design of untethered wave energy generation systems N81-23403
Distributed computing for advanced levels of machinery control N81-23458
Compensatory control of form error in machining N81-23459
Method for analysis of organic compounds in the Great Lakes
[PB81-149783] N81-23578
A motion cycle simulator for analysis and optimization of human power N81-23797
Low-energy electron diffraction study of the surface-defect structure Ge grown epitaxially on GaAs(110)
[AD-A097599] N81-23927

WISCONSIN UNIV., MADISON.
High power ICRH experiments on the Wisconsin levitated octupole
[DOE/ET-53051/15] N81-23903

WOOD ENERGY INST., CAMDEN, MAINE.
Advanced system demonstration for utilization of biomass as an energy source
[DOE/ET-20055/T5] N81-23679

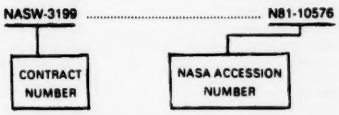
WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
A feasibility study for a versatile deep sea, multileg, stable, cable array
[AD-A097672] N81-23782

WYOMING UNIV., LARAMIE.
Bioassay of polycyclic aromatic hydrocarbons
[DOE/EV-04477/T2] N81-23677

Y

YALE UNIV., NEW HAVEN, CONN.
Bounded error adaptive control, part 1
[AD-A097628] N81-23824
The stability of second order quadratic differential equations, part 3
[AD-A097627] N81-23831

Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

ACUREX PROJ. 7740 ..... N81-23623
AF PROJ. 681E N81-23948
AF PROJ. 2002 ..... N81-23390
AF PROJ. 2051 ..... N81-23083
N81-23084
AF PROJ. 2054 ..... N81-23628
AF PROJ. 2301 ..... N81-23247
N81-23356
AF PROJ. 2303 ..... N81-23284
N81-23794
AF PROJ. 2304 ..... N81-23025
N81-23365
N81-23806
N81-23808
N81-23809
N81-23810
N81-23821
N81-23825
N81-23857
AF PROJ. 2305 ..... N81-23349
N81-23368
N81-23386
N81-23436
N81-23453
AF PROJ. 2306 ..... N81-23928
N81-23929
AF PROJ. 2307 ..... N81-23042
N81-23090
N81-23195
N81-23246
N81-23424
N81-23425
AF PROJ. 2308 ..... N81-23208
N81-23210
N81-23419
N81-23420
AF PROJ. 2311 ..... N81-23894
AF PROJ. 2313 ..... N81-23793
N81-23795
AF PROJ. 2314 ..... N81-23826
AF PROJ. 2317 ..... N81-23357
AF PROJ. 2402 ..... N81-23465
AF PROJ. 3048 ..... N81-23073
AF PROJ. 3654 ..... N81-23183
AF PROJ. 4506 ..... N81-23391
AF PROJ. 4519 ..... N81-23367
N81-23896
AF PROJ. 4594 ..... N81-23567
AF PROJ. 4600 ..... N81-23351
AF PROJ. 6114 ..... N81-23802
N81-23818
AF PROJ. 6244 ..... N81-23895
AF PROJ. 6302 ..... N81-23714
AF PROJ. 6340 ..... N81-23354
N81-23355
AF PROJ. 6440 ..... N81-23816
AF PROJ. 6670 ..... N81-23770
AF PROJ. 6893 ..... N81-23803
AF PROJ. 7184 ..... N81-23801
AF PROJ. 7670 ..... N81-23749
N81-23750
N81-23893
AF-AFOSR-0029-79 ..... N81-23365
AF-AFOSR-0074-80 ..... N81-23808
AF-AFOSR-0102-80 ..... N81-23025
AF-AFOSR-0108-80 ..... N81-23453
AF-AFOSR-0121-80 ..... N81-23928
AF-AFOSR-0126-80 ..... N81-23810
AF-AFOSR-0132-80 ..... N81-23247
AF-AFOSR-0143-80 ..... N81-23822
AF-AFOSR-2927-76 ..... N81-23857
AF-AFOSR-3181-77 ..... N81-23808
N81-23821
AF-AFOSR-3451-77 ..... N81-23356
AF-AFOSR-3683-78 ..... N81-23284
AF-AFOSR-3684-78 ..... N81-23929
AF-AFOSR-3685-78 ..... N81-23450
ARPA ORDER 2683 ..... N81-23449
ARPA ORDER 3045 ..... N81-23835
ARPA ORDER 3578 ..... N81-23452
ARPA ORDER 3654 ..... N81-23183
ARPA ORDER 3713 ..... N81-23382
AT(29-1)-789 ..... N81-23437
BMFT-01YX16-ZK-WRT-5007 ..... N81-23139
DA PROJ. 1F2-62209-AH-76 ..... N81-23438
DA PROJ. 1L1-61101-A91-A N81-23892
DA PROJ. 1L1-61102-AH-42 ..... N81-23250
DA PROJ. 1L1-61102-AH-43 ..... N81-23423
DA PROJ. 1L1-61102-AH-47 ..... N81-23211
DA PROJ. 1L1-61102-BH-57 ..... N81-23437
DA PROJ. 1L1-62111-AH-71 ..... N81-23564
N81-23767
N81-23771
N81-23772
DA PROJ. 1L1-62303-A-214 ..... N81-23439
DA PROJ. 1T1-61102-A-91A N81-23440
DA PROJ. 4A7-61102-AT-43 ..... N81-23326
DA PROJ. 4A7-62731-AT-41 ..... N81-23949
DAAG29-76-C-0010 ..... N81-23773
DAAG29-76-D-0100 ..... N81-23564
N81-23767
DAAG29-76-G-0254 ..... N81-23463
DAAG29-77-G-0175 ..... N81-23566
DAAG29-77-G-0231 ..... N81-23277
DAAG29-78-C-0002 ..... N81-23864
DAAG29-78-G-0145 ..... N81-23388
DAAG29-79-C-0078 ..... N81-23389
DAAG29-79-C-0086 ..... N81-23828
N81-23834
DAAG29-79-C-0155 ..... N81-23381
DAAG29-79-G-0023 ..... N81-23383
DAAG29-79C-0110 ..... N81-23830
DAAG29-80-C-0010 ..... N81-23366
DAAG46-78-C-0032 ..... N81-23250
DAAH01-80-D-0010 ..... N81-23178
DAAJ02-75-C-0050 ..... N81-23438
DAAK20-80-C-0260 ..... N81-23387
DAAK70-77-C-0157 ..... N81-23380
DAAK70-79-C-0150 ..... N81-23890
DAAK70-79-C-0171 ..... N81-23348
DARPA ORDER 3718 ..... N81-23885
DARPA ORDER 3831 ..... N81-23839
DARPA ORDER 4040 ..... N81-23451
DE-AC01-76ET-10204 ..... N81-23308
DE-AC01-76ET-10340 ..... N81-23470
N81-23473
DE-AC01-76ET-10722 ..... N81-23569
N81-23574
N81-23575
N81-23576
DE-AC01-77ET-10496 ..... N81-23254
DE-AC01-79CS-30027 ..... N81-23647
DE-AC01-79ER-10029 ..... N81-23216
DE-AC01-79ET-29349 ..... N81-23643
DE-AC01-79PE-70044 ..... N81-23639
DE-AC01-80ET-15611 ..... N81-23902
DE-AC01-80PE-70278 ..... N81-23698
DE-AC01-80RA-50108 ..... N81-23631
DE-AC02-76CH-00016 ..... N81-23228
N81-23916
N81-23932
DE-AC02-76ER-03077 ..... N81-23041
DE-AC02-76ET-20279 ..... N81-23650
DE-AC02-77CH-00178 ..... N81-23214
N81-23501
N81-23502
N81-23641
N81-23646
N81-23648
N81-23659
N81-23660
N81-23661
N81-23676
N81-23683
N81-23684
N81-23689
N81-23690
N81-23691
N81-23930
DE-AC02-79ER-10382 ..... N81-23296
DE-AC02-79ER-10439 ..... N81-23226
DE-AC02-79ER-10450 ..... N81-23294
DE-AC02-79ER-10466 ..... N81-23460
N81-23468
DE-AC02-79ET-23004 ..... N81-23632
DE-AC02-79ET-27225 ..... N81-23429
DE-AC02-79EV-10038 ..... N81-23783
DE-AC02-80ER-10632 ..... N81-23213
DE-AC02-80ER-10660 ..... N81-23225
DE-AC02-81ER-10841 ..... N81-23844
DE-AC03-76SF-00326 ..... N81-23830
DE-AC03-77ET-10296 ..... N81-23310
DE-AC03-79CS-30307 ..... N81-23671
N81-23672
N81-23673
N81-23674
DE-AC03-79SF-10601 ..... N81-23680
N81-23681
N81-23682
DE-AC03-80SF-10802 ..... N81-23657
DE-AC03-80SF-11421 ..... N81-23640
DE-AC03-81EV-10506 ..... N81-23395
DE-AC04-76DP-00789 ..... N81-23260
N81-23297
N81-23399
N81-23635
N81-23678
N81-23687
N81-23702
N81-23705
N81-23706
N81-23717
N81-23756
N81-23811
N81-23909
DE-AC04-76DP-00989 ..... N81-23779
DE-AC04-76EV-01013 ..... N81-23718
N81-23719
DE-AC05-76ET-10670 ..... N81-23253
DE-AC05-76OR-00033 ..... N81-23642
DE-AC06-76RL-01830 ..... N81-23428
N81-23503
N81-23634
N81-23725
N81-23882
DE-AC06-77ET-20055 ..... N81-23662
N81-23663
N81-23664
N81-23665

N81-23666
N81-23667
N81-23668
DE-AC06-77RL-01030 N81-23880
DE-AC07-76ID-01570 N81-23644
N81-23865
N81-23977
DE-AC07-79ID-12047 N81-23636
DE-AC08-78DP-40069 N81-23454
DE-AC08-80ET-27081 N81-23570
DE-AC19-79BC-10045 N81-23316
DE-AC21-76ET-10520 N81-23314
DE-AC21-76ET-12138 N81-23318
DE-AC21-76MC-05194 N81-23318
DE-AC21-78ET-11330 N81-23315
DE-AC21-78MC-08089 N81-23309
DE-AC22-76ET-10532 N81-23311
DE-AC22-80PC-30075 N81-23317
DE-AC22-80PC-30293 N81-23312
DE-AC22-80PC-30294 N81-23219
DE-AC22-80PC-30300 N81-23218
DE-AI01-76CS-31037 N81-23693
DE-AI01-76CS-51011 N81-23603
DE-AI01-76ET-20356 N81-23601
DE-AI01-77CS-51040 N81-23609
DE-AI01-77CS-51044 N81-23608
DE-AI01-77ET-10769 N81-23610
N81-23611
DE-AI01-78CS-54209 N81-23602
DE-AI03-80ET-17088 N81-23600
DE-AM02-76CH-03075 N81-23913
DE-AP03-80SF-12989 N81-23968
DE-AS02-76DP-40048 N81-23912
DE-AS02-76ER-02462 N81-23261
DE-AS02-76ER-02872 N81-23258
DE-AS02-76ER-02899 N81-23933
DE-AS02-76ER-02923 N81-23295
DE-AS02-76ET-5204 N81-23918
DE-AS02-76ET-28317 N81-23256
DE-AS02-76ET-37237 N81-23876
DE-AS02-76ET-37240 N81-23703
DE-AS02-77ER-04220 N81-23224
DE-AS02-77ER-04440 N81-23196
DE-AS02-77ER-04452 N81-23788
DE-AS02-77EV-04361 N81-23869
DE-AS02-77EV-04477 N81-23677
DE-AS02-78ER-04946 N81-23262
DE-AS02-78ER-04991 N81-23229
DE-AS02-78ER-05002 N81-23931
DE-AS02-78ER-10107 N81-23914
DE-AS05-76ER-05223 N81-23874
DE-AS05-76ET-10463 N81-23716
DE-AS05-76EV-04703 N81-23875
DE-AS05-80ER-10635 N81-23911
DE-AS09-76ER-00946 N81-23877
DE-AS09-76EV-00639 N81-23728
DE-AS21-77MC-08196 N81-23257
DE-AT03-76EP-72018 N81-23830
DE-AT03-76ET-51011 N81-23901
DE-AT03-76SF-70046 N81-23866
DE-AT03-76SF-70060 N81-23638
DE-FC07-79ID-012030 N81-23568
DE-FG02-75R5-10149 N81-23658
DE-FG02-79R5-10148 N81-23637
DE-FG02-79R5-10157 N81-23976
DE-FG04-77CS-34127 N81-23630
DE-FG05-78ET-28456 N81-23656
DE-FG22-80PC-30217 N81-23320
DEN3-163 N81-23598
DEN3-201 N81-23600
DI-BM-G0-264024 N81-23747
N81-23758
DI-14-31-0001-3811 N81-23577
N81-23983
DI-14-34-0001-0127 N81-23584
DI-14-34-0001-0134 N81-23588
DI-14-34-0001-9027 N81-23584
DLA900-79-C-0539 N81-23945
DOT-AT-800015 N81-23975
DOT-FA72WAI-261 N81-23063
DOT-FA78WA-4242 N81-23097
DOT-FH-7-3-0067 N81-23333
E(40-1)-5076 N81-23716
E(49-18)-1231 N81-23574
N81-23575
EF-76-C-01-2315 N81-23311
EF-77-A-01-2593 N81-23243
EF-77-C-01-2621 N81-23254
EG-77-C-01-4042 N81-23393
N81-23394

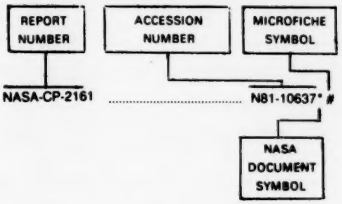
EG-77-C-03-1473 N81-23392
EG-77-C-05-1473 N81-23392
EG-77-R-06-1036 N81-23662
N81-23663
N81-23664
N81-23665
N81-23666
N81-23667
N81-23668
N81-23679
EG-77-S-02-4220 N81-23224
EG-77-S-02-4440 N81-23196
EPA-R-805725 N81-23734
EPA-68-01-3882 N81-23735
N81-23736
EPA-68-01-5848 N81-23729
EPA-68-01-5915 N81-23731
EPA-68-01-6111 N81-23735
N81-23736
EPA-68-02-2548 N81-23730
EPA-68-03-2387 N81-23324
EPA-68-03-2459 N81-23982
EPA-68-03-2881 N81-23474
EPRI PROJ. 514-1 N81-23876
EPRI PROJ. 700-6 N81-23252
EPRI PROJ. 868-1 N81-23571
N81-23572
EPRI PROJ. 901-1 N81-23427
EPRI PROJ. 988-1 N81-23307
EPRI PROJ. 989-3 N81-23215
EPRI PROJ. 1085-1 N81-23694
EPRI PROJ. 1187-3 N81-23471
N81-23472
EPRI PROJ. 1191-6 N81-23696
EPRI PROJ. 1273-1 N81-23651
EPRI PROJ. 1348-1 N81-23645
EPRI PROJ. 1461 N81-23704
EPRI PROJ. 1524-2 N81-23978
ER-78-S-02-5098 N81-23914
ET-78-A-03-2208 N81-23648
ET-78-G-05-5917 N81-23656
EX-76-C-01-1231 N81-23569
N81-23574
N81-23575
N81-23576
EX-76-C-01-1784 N81-23253
EX-76-C-01-2307 N81-23314
EX-76-C-01-2394 N81-23606
EX-76-C-01-2397 N81-23597
EY-76-C-04-3683 N81-23306
EY-76-S-02-2602 N81-23256
EY-76-S-05-5076 N81-23716
EY-76-02-2899 N81-23933
EY-77-S-21-8196 N81-23257
FAA PROJ. 131-401-840 N81-23769
FAA PROJ. 154-451-180 N81-23768
FAA PROJ. 219-151-200 N81-23060
F04611-79-C-0009 N81-23291
F04701-80-C-0081 N81-23364
N81-23385
N81-23753
F19628-78-C-0040 N81-23386
F19628-78-C-0130 N81-23770
F19628-78-C-0200 N81-23749
F19628-79-C-0025 N81-23514
F19628-79-C-0120 N81-23893
F19628-79-C-0166 N81-23351
F19628-80-C-0001 N81-23816
F19628-80-C-0002 N81-23063
F19628-81-C-0001 N81-23354
N81-23355
F30602-77-C-0182 N81-23367
F30602-78-C-0054 N81-23895
F30602-78-C-0102 N81-23368
F30602-78-C-0332 N81-23567
F30602-79-C-0176 N81-23948
F30602-80-C-0063 N81-23391
F30602-80-C-0096 N81-23183
F33615-75-C-5218 N81-23083
N81-23084
F33615-76-C-3062 N81-23465
F33615-76-C-5005 N81-23714
F33615-76-C-5191 N81-23246
F33615-76-C-5245 N81-23246
F33615-77-C-0017 N81-23802

F33615-77-C-0042 N81-23793
F33615-77-C-0075 N81-23325
F33615-77-C-0520 N81-23801
F33615-77-C-1132 N81-23390
F33615-77-C-2010 N81-23420
F33615-78-C-0013 N81-23818
F33615-78-C-0051 N81-23802
F33615-78-C-2001 N81-23073
F33615-79-C-0500 N81-23803
F33615-79-C-3601 N81-23825
N81-23826
F41608-79-D-A014 N81-23938
F41698-79-D-A014 N81-23939
F44620-75-C-0080 N81-23415
F44620-76-C-0021 N81-23419
F44620-76-C-0048 N81-23425
F49620-77-C-0052 N81-23349
F49620-77-C-0085 N81-23208
F49620-78-C-0033 N81-23210
F49620-78-C-0034 N81-23195
F49620-78-C-0061 N81-23436
F49620-79-C-0002 N81-23090
F49620-79-C-0188 N81-23805
F49620-79-C-0203 N81-23424
F49620-79-C-0226 N81-23042
F49620-79-C-0233 N81-23795
F49620-80-C-0001 N81-23809
F49620-80-C-0006 N81-23894
F49620-80-C-0092 N81-23415
GEN. ATOMIC PROJ. 3235 N81-23901
GEN. ATOMIC PROJ. 3246 N81-23638
HUD-IA-655 N81-23327
JPL PROJ. 2364 N81-23615
JPL PROJ. 5030-462 N81-23602
JPL PROJ. 5220-10 N81-23601
JPL-954331 N81-23613
JPL-954739 N81-23619
JPL-954796 N81-23622
JPL-954852 N81-23618
JPL-955328 N81-23615
JPL-955387 N81-23612
JPL-955454 N81-23614
JPL-955477 N81-23623
N81-23624
JPL-955639 N81-23620
JPL-955699 N81-23621
JPL-955787 N81-23617
JPL-955902 N81-23616
MA-79-SAC-B0018 N81-23430
MDA903-78-C-0284 N81-23452
MDA903-79-C-0212 N81-23382
MDA903-80-C-0194 N81-23839
MDA903-81-C-0034 N81-23451
MIPR-ARO-20-78 N81-23777
MIPR-8311-0089 N81-23303
NAGW-57 N81-23548
NAGW-95 N81-23551
NAG1-56 N81-23993
NAG1-148 N81-23926
NAG2-8 N81-23093
NAG2-45 N81-23433
NAG2-57 N81-23547
NAG2-77 N81-23514
NAG2-94 N81-23991
NAG3-46 N81-23491
NAG6-8 N81-23766
NASA ORDER S-40198-B N81-23543
NASA ORDER S-50030-AG N81-23508
NASW-2342 N81-23078
NASW-3270 N81-23867
NASW-3327 N81-23741
NASW-3378 N81-23506
NASW-3393 N81-23739
N81-23740
NASW-3434 N81-23741
NASW-13709 N81-23989
NAS1-14880 N81-23059
NAS1-14970 N81-23712
NAS1-15214 N81-23053
NAS1-15414 N81-23487
NAS1-15760 N81-23477
NAS1-15772 N81-23181
NAS1-15844 N81-23414
NAS1-15951 N81-23027
NAS1-15956 N81-23192
NAS1-15988 N81-23411
NAS2-3395 N81-23513
NAS2-9337 N81-23058
NAS2-9414 N81-23174
NAS2-9434 N81-23095

NAS2-9615 N81-23028
NAS2-9805 N81-23068
NAS2-10021 N81-23080
NAS2-10160 N81-23064
N81-23065
NAS2-10344 N81-23030
N81-23031
N81-23032
N81-23033
NAS2-10623 N81-23029
NAS3-20632 N81-23086
NAS3-21366 N81-23345
N81-23346
NAS3-22361 N81-23069
NAS3-22384 N81-23070
NAS3-22461 N81-23347
NAS5-24331 N81-23523
N81-23527
NAS5-24383 N81-23544
NAS5-25773 N81-23513
NAS7-100 N81-23300
N81-23344
N81-23562
N81-23563
N81-23601
N81-23602
N81-23603
N81-23620
N81-23623
N81-23814
N81-23975
N81-23997
NAS8-31171 N81-23760
NAS8-32036 N81-23605
N81-23607
NAS8-32254 N81-23604
NAS8-32475 N81-23595
N81-23599
NAS8-32844 N81-23522
NAS8-33245 N81-23924
N81-23925
NAS8-33452 N81-23184
N81-23185
N81-23186
NAS8-33554 N81-23100
NAS8-33801 N81-23187
NAS8-33992 N81-23527
NAS8-34334 N81-23763
NAS9-10364 N81-23242
NAS9-15800 N81-23812
NAS9-15964 N81-23561
NAS9-16008 N81-23800
NAS10-9410 N81-23554
N81-23555
N81-23556
N81-23557
N81-23558
N81-23559
N81-23560
NCC1-26 N81-23492
NCC2-55 N81-23343
N81-23861
NCC2-71 N81-23193
NGL-22-009-124 N81-23829
NGL-23-004-083 N81-23545
NGL-39-009-003 N81-23538
NGR-14-005-181 N81-23526
N81-23530
NGR-22-009-818 N81-23035
NGR-33-016-086 N81-23765
NR PROJ. 042-034 N81-23840
NR PROJ. 042-238 N81-23832
NR PROJ. 042-267 N81-23841
NR PROJ. 042-373 N81-23842
NR PROJ. 047-061 N81-23817
NR PROJ. 047-143 N81-23830
NR PROJ. 047-202 N81-23852
N81-23853
N81-23854
N81-23855
N81-23856
N81-23966
N81-23967
N81-23970
NR PROJ. 049-456 N81-23381
NR PROJ. 053-559 N81-23286
NR PROJ. 056-498 N81-23212
NR PROJ. 061-243 N81-23041
NR PROJ. 064-478 N81-23495
NR PROJ. 064-624 N81-23789
NR PROJ. 081-340 N81-23744
NR PROJ. 092-555 N81-23281
N81-23282
N81-23283
NR PROJ. 092-558 N81-23194
NR PROJ. 197-050 N81-23792
NR PROJ. 197-065 N81-23849
N81-23940
N81-23941
NR PROJ. 274-331 N81-23350
NR PROJ. 322-072 N81-23209
N81-23927
NR PROJ. 359-718 N81-23833
NR PROJ. 393-041 N81-23207
NR PROJ. 393-506 N81-23449
NR PROJ. 356646 N81-23287
NSF ATM-78-08865 N81-23777
NSF ATM-78-10501 N81-23514
NSF ATM-79-11174 N81-23513
NSF ATM-79-22006 N81-23038
NSF ATM-80-05088 N81-23523
NSF CME-79-19817 N81-23038
NSF CME-80-12956 N81-23492
NSF DAR-79-17715 N81-23401
NSF DAR-79-17826 N81-23859
NSF DMR-78-12804 N81-23931
NSF DSI-77-18052 N81-23944
NSF ECS-79-19880 N81-23835
NSF ECS-80-12974 N81-23830
NSF ENV-77-15333 N81-23329
NSF MCS-76-81259 N81-23817
NSF MCS-77-15628 N81-23381
NSF MCS-77-16974 N81-23842
NSF MCS-78-06718 N81-23834
NSF MCS-79-02773 N81-23828
NSF MCS-79-24370 N81-23381
NSF MCS-79-26009 N81-23830
NSF MSC-77-23579 N81-23834
NSF MSC-78-06718 N81-23828
NSF PFR-78-22265 N81-23832
NSG-1124 N81-23489
NSG-1379 N81-23889
NSG-1561 N81-23034
NSG-2003 N81-23553
NSG-2038 N81-23193
NSG-2215 N81-23488
NSG-2269 N81-23799
NSG-2299 N81-23415
NSG-2382 N81-23038
NSG-3228 N81-23863
NSG-3264 N81-23416
NSG-3280 N81-23413
NSG-4001 N81-23762
NSG-4023 N81-23040
NSG-4024 N81-23762
NSG-5212 N81-23538
NSG-7092 N81-23868
NSG-8065 N81-23764
N00014-74-C-0278 N81-23464
N00014-75-C-0267 N81-23830
N00014-75-C-0302 N81-23496
N81-23497
N00014-75-C-0417 N81-23286
N00014-75-C-0442 N81-23840
N00014-75-C-0451 N81-23851
N81-23852
N81-23853
N81-23854
N81-23855
N81-23856
N81-23966
N81-23967
N81-23970
N00014-75-C-0455 N81-23843
N00014-75-C-0602 N81-23212
N00014-75-C-0781 N81-23832
N00014-75-C-0809 N81-23827
N00014-75-C-1015 N81-23789
N00014-75-C-1183 N81-23835
N00014-76-C-0017 N81-23824
N81-23831
N00014-76-C-0060 N81-23495
N00014-76-C-0123 N81-23449
N00014-76-C-0235 N81-23499
N81-23500
N00014-76-C-0408 N81-23281
N81-23282
N81-23283
N00014-76-C-0418 N81-23817
N00014-76-C-0475 N81-23841
N00014-76-C-0700 N81-23290
N00014-77-C-0032 N81-23041
N00014-77-C-0097 N81-23858
N00014-77-C-0306 N81-23842
N00014-77-C-0311 N81-23287
N00014-77-C-0371 N81-23815
N00014-77-C-0378 N81-23815
N00014-77-C-0474 N81-23209
N81-23927
N00014-78-C-0245 N81-23285
N00014-78-C-0549 N81-23278
N00014-78-C-0555 N81-23792
N00014-79-C-0067 N81-23748
N00014-79-C-0158 N81-23754
N00014-79-C-0322 N81-23745
N81-23746
N81-23844
N81-23845
N81-23846
N81-23847
N81-23848
N00014-79-C-0488 N81-23207
N00014-79-C-0690 N81-23565
N00014-79-C-0873 N81-23381
N00014-79-C-0894 N81-23782
N00014-79-C-0991 N81-23276
N00014-80-C-0031 N81-23421
N00014-80-C-0046 N81-23850
N00014-80-C-0107 N81-23833
N00014-80-C-0213 N81-23194
N00014-80-C-0221 N81-23381
N00014-80-C-0270 N81-23350
N00014-80-C-0542 N81-23849
N81-23940
N81-23941
N00019-80-C-0050 N81-23353
N00019-80-C-0248 N81-23778
N00039-80-WR-09137 N81-23362
N00140-79-C-6628 N81-23369
N00173-79-C-0341 N81-23891
N60530-79-C-0006 N81-23302
N60921-80-WR-W0188 N81-23885
N62269-78-C-0363 N81-23075
N62376-79-WR-00014 N81-23715
OWRT PROJ. A-023-ARK(3) N81-23586
PROJ. SYMPHONIE N81-23103
N81-23104
RR011301 N81-23207
RR0210542 N81-23384
RR0220844 N81-23466
RR0420401 N81-23858
SRI PROJ. PYU-7802 N81-23278
SRI PROJ. 7028 N81-23210
SRI PROJ. 7863 N81-23730
W-31-109-ENG-38 N81-23227
N81-23292
N81-23573
N81-23594
N81-23669
N81-23670
N81-23692
N81-23699
N81-23722
N81-23878
N81-23907
N81-23908
N81-23915
W-7405-ENG-26 N81-23190
N81-23191
N81-23443
N81-23686
N81-23697
N81-23720
N81-23727
N81-23884
N81-23899
N81-23905
N81-23906
W-7405-ENG-36 N81-23189
N81-23442
N81-23685
N81-23701
N81-23823
N81-23836
N81-23872
N81-23883
N81-23898
N81-23904
N81-23917
N81-23918

	N81-23921
	N81-23934
	N81-23935
	N81-23953
W-7405-ENG-48	N81-23220
	N81-23222
	N81-23223
	N81-23230
	N81-23251
	N81-23255
	N81-23298
	N81-23371
	N81-23444
	N81-23455
	N81-23456
	N81-23504
	N81-23695
	N81-23726
	N81-23757
	N81-23784
	N81-23790
	N81-23837
	N81-23870
	N81-23885
	N81-23910
	N81-23919
	N81-23920
	N81-23922
	N81-23950
	N81-23980
	N81-23981
W-7405-ENG-82	N81-23221
	N81-23259
	N81-23313
	N81-23398
	N81-23723
	N81-23724
	N81-23871
	N81-23873
WF4140100	N81-23466
WF12141604	N81-23359
WF41400000	N81-23043
WF61562001	N81-23288
YF53534006	N81-23755
YF59556091	N81-23467
102-41-27	N81-23739
	N81-23740
141-20-11	N81-23040
146-20-01-03	N81-23742
176-30-11	N81-23553
505-06-53-01	N81-23034
505-09-42-02	N81-23799
505-31-33-04	N81-23036
	N81-23096
505-32-03-05	N81-23410
505-32-42	N81-23462
505-33-53-01	N81-23072
505-35-13-01	N81-23712
	N81-23713
505-35-23-01	N81-23791
505-44-12	N81-23070
505-44-14	N81-23762
506-52-19	N81-23186
506-53-12	N81-23417
	N81-23418
506-53-31	N81-23037
506-53-64	N81-23067
506-55-42	N81-23625
	N81-23626
	N81-23627
530-04-11	N81-23039
532-03-11	N81-23813
533-01-13-07	N81-23071
650-60-18	N81-23347
778-36-05	N81-23602
805-91	N81-23434
910-44	N81-23838
910-44-00-00-72	N81-23182
935-21-89	N81-23187
976-52-62	N81-23601
992-19-00-18	N81-23432

Typical Report/Accession Number Index Listing



Listings in this index are arranged alpha-numerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-7589 ..... N81-23798* #
A-7706 ..... N81-23799* #
A-8478 ..... N81-23039* #
A-8482 ..... N81-23434* #
A-8554 ..... N81-23037* #
A-8560 ..... N81-23813* #

AAMU-NSG-8065-03 ..... N81-23764* #

AC/243(CC)D/12 ..... N81-23094 #

ACI-042281-F ..... N81-23763* #

ACUREX-FR-80-16/AE ..... N81-23623* #
ACUREX-FR-81-10/AE ..... N81-23624* #

AD-A096187 ..... N81-23818 #
AD-A097080 ..... N81-23714 #
AD-A097081 ..... N81-23858 #
AD-A097082 ..... N81-23440 #
AD-A097084 ..... N81-23946 #
AD-A097088 ..... N81-23305 #
AD-A097089 ..... N81-23897 #
AD-A097090 ..... N81-23750 #
AD-A097102 ..... N81-23353 #
AD-A097106 ..... N81-23842 #
AD-A097107 ..... N81-23841 #
AD-A097108 ..... N81-23817 #
AD-A097109 ..... N81-23464 #
AD-A097110 ..... N81-23840 #
AD-A097115 ..... N81-23062 #
AD-A097116 ..... N81-23467 #
AD-A097117 ..... N81-23849 #
AD-A097121 ..... N81-23822 #
AD-A097125 ..... N81-23288 #
AD-A097130 ..... N81-23441 #
AD-A097131 ..... N81-23495 #
AD-A097134 ..... N81-23749 #
AD-A097141 ..... N81-23420 #
AD-A097142 ..... N81-23041 #
AD-A097159 ..... N81-23744 #
AD-A097160 ..... N81-23948 #
AD-A097162 ..... N81-23755 #
AD-A097163 ..... N81-23496 #
AD-A097164 ..... N81-23497 #
AD-A097165 ..... N81-23380 #
AD-A097166 ..... N81-23857 #
AD-A097174 ..... N81-23285 #
AD-A097187 ..... N81-23391 #
AD-A097188 ..... N81-23350 #
AD-A097194 ..... N81-23498 #
AD-A097195 ..... N81-23024 #
AD-A097197 ..... N81-23301 #
AD-A097198 ..... N81-23249 #
AD-A097199 ..... N81-23077 #
AD-A097200 ..... N81-23493 #
AD-A097201 ..... N81-23436 #
AD-A097202 ..... N81-23892 #
AD-A097206 ..... N81-23183 #
AD-A097208 ..... N81-23802 #
AD-A097212 ..... N81-23628 #
AD-A097215 ..... N81-23424 #
AD-A097222 ..... N81-23949 #
AD-A097223 ..... N81-23282 #
AD-A097224 ..... N81-23567 #
AD-A097227 ..... N81-23751 #
AD-A097228 ..... N81-23787 #
AD-A097229 ..... N81-23280 #
AD-A097230 ..... N81-23466 #
AD-A097231 ..... N81-23809 #
AD-A097232 ..... N81-23283 #
AD-A097243 ..... N81-23806 #
AD-A097244 ..... N81-23419 #
AD-A097246 ..... N81-23450 #
AD-A097262 ..... N81-23351 #
AD-A097274 ..... N81-23752 #
AD-A097277 ..... N81-23247 #
AD-A097278 ..... N81-23821 #
AD-A097279 ..... N81-23365 #
AD-A097280 ..... N81-23808 #
AD-A097283 ..... N81-23438 #
AD-A097289 ..... N81-23089 #
AD-A097292 ..... N81-23819 #
AD-A097295 ..... N81-23839 #
AD-A097296 ..... N81-23090 #
AD-A097297 ..... N81-23195 #
AD-A097299 ..... N81-23439 #
AD-A097330 ..... N81-23820 #
AD-A097334 ..... N81-23097 #
AD-A097336 ..... N81-23368 #
AD-A097337 ..... N81-23386 #
AD-A097338 ..... N81-23778 #
AD-A097339 ..... N81-23083 #
AD-A097340 ..... N81-23947 #
AD-A097341 ..... N81-23565 #
AD-A097350 ..... N81-23499 #
AD-A097351 ..... N81-23500 #
AD-A097352 ..... N81-23210 #
AD-A097354 ..... N81-23357 #
AD-A097355 ..... N81-23388 #
AD-A097356 ..... N81-23043 #
AD-A097357 ..... N81-23349 #
AD-A097358 ..... N81-23890 #
AD-A097359 ..... N81-23894 #
AD-A097360 ..... N81-23803 #
AD-A097361 ..... N81-23276 #
AD-A097362 ..... N81-23356 #
AD-A097363 ..... N81-23929 #
AD-A097368 ..... N81-23422 #
AD-A097375 ..... N81-23810 #
AD-A097377 ..... N81-23566 #
AD-A097384 ..... N81-23807 #
AD-A097388 ..... N81-23281 #
AD-A097389 ..... N81-23945 #
AD-A097390 ..... N81-23194 #
AD-A097391 ..... N81-23073 #
AD-A097405 ..... N81-23206 #
AD-A097407 ..... N81-23830 #
AD-A097409 ..... N81-23940 #
AD-A097410 ..... N81-23928 #
AD-A097411 ..... N81-23828 #
AD-A097412 ..... N81-23834 #
AD-A097413 ..... N81-23463 #
AD-A097414 ..... N81-23773 #
AD-A097418 ..... N81-23941 #
AD-A097419 ..... N81-23074 #
AD-A097420 ..... N81-23494 #
AD-A097423 ..... N81-23453 #
AD-A097424 ..... N81-23284 #
AD-A097425 ..... N81-23211 #
AD-A097426 ..... N81-23190 #
AD-A097427 ..... N81-23452 #
AD-A097429 ..... N81-23774 #
AD-A097430 ..... N81-23246 #
AD-A097431 ..... N81-23425 #
AD-A097438 ..... N81-23084 #
AD-A097439 ..... N81-23390 #
AD-A097442 ..... N81-23208 #
AD-A097444 ..... N81-23891 #
AD-A097445 ..... N81-23832 #
AD-A097447 ..... N81-23286 #
AD-A097448 ..... N81-23437 #
AD-A097449 ..... N81-23793 #
AD-A097450 ..... N81-23426 #
AD-A097453 ..... N81-23277 #
AD-A097454 ..... N81-23775 #
AD-A097455 ..... N81-23278 #
AD-A097460 ..... N81-23848 #
AD-A097461 ..... N81-23421 #
AD-A097462 ..... N81-23847 #
AD-A097463 ..... N81-23746 #
AD-A097469 ..... N81-23250 #
AD-A097471 ..... N81-23423 #
AD-A097472 ..... N81-23303 #
AD-A097474 ..... N81-23302 #
AD-A097475 ..... N81-23846 #
AD-A097476 ..... N81-23381 #
AD-A097477 ..... N81-23451 #
AD-A097486 ..... N81-23359 #
AD-A097488 ..... N81-23745 #
AD-A097489 ..... N81-23845 #
AD-A097492 ..... N81-23279 #
AD-A097505 ..... N81-23075 #
AD-A097514 ..... N81-23844 #
AD-A097516 ..... N81-23327 #
AD-A097517 ..... N81-23937 #
AD-A097518 ..... N81-23754 #
AD-A097522 ..... N81-23082 #
AD-A097523 ..... N81-23753 #
AD-A097526 ..... N81-23794 #
AD-A097527 ..... N81-23771 #
AD-A097528 ..... N81-23564 #
AD-A097529 ..... N81-23767 #
AD-A097531 ..... N81-23384 #
AD-A097532 ..... N81-23360 #
AD-A097533 ..... N81-23853 #
AD-A097535 ..... N81-23852 #
AD-A097536 ..... N81-23856 #
AD-A097537 ..... N81-23855 #
AD-A097538 ..... N81-23966 #
AD-A097539 ..... N81-23970 #
AD-A097540 ..... N81-23967 #
AD-A097541 ..... N81-23854 #
AD-A097542 ..... N81-23795 #
AD-A097546 ..... N81-23248 #
AD-A097547 ..... N81-23382 #
AD-A097548 ..... N81-23025 #
AD-A097549 ..... N81-23825 #
AD-A097550 ..... N81-23826 #
AD-A097551 ..... N81-23088 #
AD-A097552 ..... N81-23087 #
AD-A097553 ..... N81-23777 #
AD-A097556 ..... N81-23383 #
AD-A097557 ..... N81-23389 #
AD-A097560 ..... N81-23042 #
AD-A097562 ..... N81-23358 #
AD-A097563 ..... N81-23449 #
AD-A097565 ..... N81-23289 #
AD-A097566 ..... N81-23768 #
AD-A097567 ..... N81-23769 #
AD-A097568 ..... N81-23060 #
AD-A097569 ..... N81-23061 #
AD-A097570 ..... N81-23063 #
AD-A097571 ..... N81-23361 #
AD-A097577 ..... N81-23291 #
AD-A097584 ..... N81-23850 #
AD-A097586 ..... N81-23816 #
AD-A097587 ..... N81-23896 #
AD-A097588 ..... N81-23207 #

AD-A097592 ..... N81-23770 #
AD-A097593 ..... N81-23893 #
AD-A097597 ..... N81-23326 #
AD-A097598 ..... N81-23209 #
AD-A097599 ..... N81-23927 #
AD-A097604 ..... N81-23081 #
AD-A097608 ..... N81-23805 #
AD-A097609 ..... N81-23772 #
AD-A097613 ..... N81-23851 #
AD-A097614 ..... N81-23212 #
AD-A097619 ..... N81-23843 #
AD-A097620 ..... N81-23367 #
AD-A097621 ..... N81-23827 #
AD-A097622 ..... N81-23801 #
AD-A097623 ..... N81-23835 #
AD-A097624 ..... N81-23178 #
AD-A097626 ..... N81-23864 #
AD-A097627 ..... N81-23831 #
AD-A097628 ..... N81-23824 #
AD-A097630 ..... N81-23815 #
AD-A097631 ..... N81-23833 #
AD-A097632 ..... N81-23789 #
AD-A097634 ..... N81-23354 #
AD-A097635 ..... N81-23355 #
AD-A097638 ..... N81-23895 #
AD-A097641 ..... N81-23348 #
AD-A097656 ..... N81-23364 #
AD-A097657 ..... N81-23385 #
AD-A097658 ..... N81-23098 #
AD-A097663 ..... N81-23076 #
AD-A097664 ..... N81-23362 #
AD-A097665 ..... N81-23715 #
AD-A097666 ..... N81-23363 #
AD-A097667 ..... N81-23290 #
AD-A097669 ..... N81-23938 #
AD-A097670 ..... N81-23939 #
AD-A097672 ..... N81-23782 #
AD-A097673 ..... N81-23366 #
AD-A097674 ..... N81-23304 #
AD-A097675 ..... N81-23387 #
AD-A097677 ..... N81-23352 #
AD-A097678 ..... N81-23792 #
AD-A097679 ..... N81-23629 #
AD-A097683 ..... N81-23748 #
AD-A097684 ..... N81-23465 #
AD-A097685 ..... N81-23369 #
AD-A097690 ..... N81-23287 #
AD-A097691 ..... N81-23776 #
AD-A097692 ..... N81-23325 #
AD-A097950 ..... N81-23483 #

AD-E400576 ..... N81-23303 #
AD-E430532 ..... N81-23423 #
AD-E950106 ..... N81-23439 #

AESD-TME-3053 ..... N81-23598* #
AESD-TME-3103 ..... N81-23620* #

AFAMRL-TR-79-117 ..... N81-23801 #
AFAMRL-TR-80-102 ..... N81-23714 #
AFAMRL-TR-81-37 ..... N81-23803 #

AFESC/ESL-TR-80-34 ..... N81-23628 #

AFGL-ERP-702-VOL-1 ..... N81-23750 #

AFGL-TR-80-0178-VOL-1 ..... N81-23750 #
AFGL-TR-80-0207 ..... N81-23749 #
AFGL-TR-80-0250 ..... N81-23893 #
AFGL-TR-80-0263 ..... N81-23770 #

AFHRL-TR-79-41 ..... N81-23802 #
AFHRL-TR-80-42-PT-1 ..... N81-23818 #
AFHRL-TR-81-4-(I)-VOL-1 ..... N81-23083 #
AFHRL-TR-81-4-(II)-VOL-1 ..... N81-23084 #
AFHRL-TR-81-5 ..... N81-23793 #

AFOSR-80-1150TR ..... N81-23805 #
AFOSR-81-0196TR ..... N81-23436 #
AFOSR-81-0205TR ..... N81-23857 #
AFOSR-81-0241TR ..... N81-23450 #
AFOSR-81-0264TR ..... N81-23809 #
AFOSR-81-0287TR ..... N81-23208 #
AFOSR-81-0288TR ..... N81-23424 #
AFOSR-81-0306TR ..... N81-23795 #
AFOSR-81-0307TR ..... N81-23419 #
AFOSR-81-0311TR ..... N81-23810 #
AFOSR-81-0312TR ..... N81-23806 #
AFOSR-81-0313TR ..... N81-23025 #
AFOSR-81-0314TR ..... N81-23808 #
AFOSR-81-0320TR ..... N81-23821 #
AFOSR-81-0321TR ..... N81-23365 #
AFOSR-81-0323TR ..... N81-23453 #
AFOSR-81-0324TR ..... N81-23349 #
AFOSR-81-0325TR ..... N81-23928 #
AFOSR-81-0326TR ..... N81-23195 #
AFOSR-81-0327TR ..... N81-23090 #
AFOSR-81-0330TR ..... N81-23210 #
AFOSR-81-0331TR ..... N81-23042 #
AFOSR-81-0332TR ..... N81-23425 #
AFOSR-81-0334TR ..... N81-23929 #
AFOSR-81-0335TR ..... N81-23894 #
AFOSR-81-0336TR ..... N81-23356 #
AFOSR-81-0364TR-PT-2 ..... N81-23284 #

AFRPL-TR-81-11 ..... N81-23291 #

AFWAL-TR-80-1185 ..... N81-23390 #
AFWAL-TR-80-2038 ..... N81-23073 #
AFWAL-TR-80-2108 ..... N81-23420 #
AFWAL-TR-80-3055 ..... N81-23465 #
AFWAL-TR-80-3101-VOL-1 ..... N81-23825 #
AFWAL-TR-80-3101-VOL-2 ..... N81-23826 #
AFWAL-TR-80-4077 ..... N81-23246 #

AGARD-AR-146 ..... N81-23431 #

AGARD-CP-294 ..... N81-23955 #
AGARD-CP-295 ..... N81-23507 #
AGARD-CP-296 ..... N81-23044 #

AIP-80-1 ..... N81-23944 #

ALO-3683-T1 ..... N81-23306 #

AMMRC-TR-81-4 ..... N81-23250 #
AMMRC-TR-81-16 ..... N81-23945 #

ANL-80-123 ..... N81-23292 #
ANL-81-5 ..... N81-23878 #
ANL-81-7 ..... N81-23227 #

ANL/AA-20 ..... N81-23692 #

ANL/CNSV-12 ..... N81-23699 #
ANL/CNSV-13 ..... N81-23722 #

ANL/EES-TM-121-VOL-1 ..... N81-23669 #
ANL/EES-TM-121-VOL-2 ..... N81-23670 #

ANL/EMR-6 ..... N81-23573 #

ANL/FPP/TM-138 ..... N81-23907 #
ANL/FPP/TM-141 ..... N81-23915 #

ANL/MHD-80-15 ..... N81-23908 #

AQ-7919-16A ..... N81-23737 #

AR-1 ..... N81-23316 #
AR-2 ..... N81-23284 #
AR-3 ..... N81-23292 #
AR-001-811 ..... N81-23077 #
AR-002-160 ..... N81-23301 #

ARAP-438-PT-1 ..... N81-23425 #
ARAP-438-PT-2 ..... N81-23425 #

ARBRL-TR-02286 ..... N81-23423 #

ARL/MECH-ENG-NOTE-378 ..... N81-23077 #

ARL/STRUC-NOTE-461 ..... N81-23024 #

ARL/STRUC-381 ..... N81-23249 #
ARL/STRUC-382 ..... N81-23498 #
ARL/STRUC-383 ..... N81-23493 #

ARLCD-CR-81007 ..... N81-23303 #

ARO-13474.2-GS ..... N81-23773 #
ARO-13534.8-E ..... N81-23463 #
ARO-14782.1-GS ..... N81-23566 #
ARO-14795.1-E ..... N81-23864 #
ARO-15206.12-P ..... N81-23437 #
ARO-15287.6-C ..... N81-23277 #
ARO-15529.6-GS ..... N81-23777 #
ARO-16171.17-EL ..... N81-23388 #
ARO-16295.2-EL ..... N81-23383 #
ARO-16441.7-EL ..... N81-23389 #
ARO-16470.15-M ..... N81-23830 #
ARO-16567.7-M ..... N81-23828 #
ARO-16567.8-M ..... N81-23834 #
ARO-17158.1-A-EL ..... N81-23366 #

ASR-8 ..... N81-23778 #

ATC-93 ..... N81-23063 #

ATR-1 ..... N81-23805 #
ATR-3 ..... N81-23195 #
ATR-5 ..... N81-23281 #

AVRADCOM-TR-81-A-9 ..... N81-23813* #

BBC-RD-1980/16 ..... N81-23342

BBN-4605 ..... N81-23350 #
BBN-4627 ..... N81-23815 #

BER-247-112 ..... N81-23785 #

BF-R-63.297-1 ..... N81-23969 #

BM-IC-8831 ..... N81-23582 #

BM-OFR-140(2) ..... N81-23747 #
BM-OFR-142-80 ..... N81-23758 #

BM-RI-IC-8829 ..... N81-23590 #
BM-RI-IC-8835 ..... N81-23592 #

BM-RI-8425 ..... N81-23271 #
BM-RI-8426 ..... N81-23323 #
BM-RI-8430 ..... N81-23299 #
BM-RI-8431 ..... N81-23266 #
BM-RI-8434 ..... N81-23270 #
BM-RI-8435 ..... N81-23591 #
BM-RI-8437 ..... N81-23581 #
BM-RI-8443 ..... N81-23475 #
BM-RI-8444 ..... N81-23587 #
BM-RI-8446 ..... N81-23264 #
BM-RI-8447 ..... N81-23265 #
BM-RI-8454 ..... N81-23267 #
BM-RI-8456 ..... N81-23232 #
BM-RI-8469 ..... N81-23233 #
BM-RI-8470 ..... N81-23268 #
BM-RI-8472 ..... N81-23263 #
BM-RI-8477 ..... N81-23269 #
BM-RI-8478 ..... N81-23234 #
BM-RI-8481 ..... N81-23476 #
BM-RI-8485 ..... N81-23593 #
BM-RI-8487 ..... N81-23217 #

BMFT-FB-T-80-060 ..... N81-23652 #
BMFT-FB-T-80-130 ..... N81-23969 #
BMFT-FB-T-80-149 ..... N81-23370 #
BMFT-FB-T-80-151 ..... N81-23653 #

BMPR-4 ..... N81-23185* #

BNL-28668 ..... N81-23228 #
BNL-28825 ..... N81-23916 #
BNL-29048 ..... N81-23932 #

CALSPAN-6673-M-1 ..... N81-23778 #

CAM-100-35 ..... N81-23500 #
CAM-100-36 ..... N81-23499 #

CED-80-96 ..... N81-23589 #
CED-80-106 ..... N81-23711 #

CEL-TN-1590 ..... N81-23755 #

CEL-TR-882 ..... N81-23467 #

CERL-TM-E-169 ..... N81-23326 #

CHI-49 ..... N81-23414* #

COE-241 ..... N81-23430 #

CONF-800153-1 ..... N81-23880 #
CONF-800778-3 ..... N81-23916 #
CONF-800782-1 ..... N81-23870 #
CONF-800786 ..... N81-23429 #
CONF-800932-7 ..... N81-23918 #
CONF-801103-45 ..... N81-23790 #
CONF-801201-8 ..... N81-23898 #

CONF-801203-5 ..... N81-23702 #
CONF-801218-3 ..... N81-23630 #
CONF-801227-3 ..... N81-23228 #
CONF-810105-3 ..... N81-23701 #
CONF-810113-1 ..... N81-23836 #
CONF-810119-1 ..... N81-23883 #
CONF-810120-1 ..... N81-23444 #
CONF-810212-2 ..... N81-23917 #
CONF-810213-1 ..... N81-23953 #
CONF-810214-2 ..... N81-23903 #
CONF-810309-7 ..... N81-23866 #
CONF-810412-1 ..... N81-23756 #
CONF-810413-1 ..... N81-23837 #
CONF-810416-1 ..... N81-23935 #
CONF-810418-1 ..... N81-23173 #
CONF-8005136-1 ..... N81-23230 #
CONF-8010141-1 ..... N81-23442 #

CONTRIB-467 ..... N81-23786 #

COO-444-9 ..... N81-23196 #
COO-2218-189 ..... N81-23918 #
COO-2713-5 ..... N81-23293 #
COO-3004-4 ..... N81-23632 #
COO-4001-8 ..... N81-23912 #
COO-4220-4 ..... N81-23224 #
COO-4946-3 ..... N81-23262 #

CPL80-1/AFO-APP ..... N81-23795 #

CRAD-TN-1/80 ..... N81-23946 #

CRREL-SR-80-40 ..... N81-23327 #

C80-331/501 ..... N81-23632 #

DARCOM-R-310-6 ..... N81-23062 #
DARCOM-R-310-6 ..... N81-23358 #

DCIEM-80-R-45 ..... N81-23441 #

DELET-TR-80-20 ..... N81-23211 #
DELET-TR-80-0260-1 ..... N81-23387 #

DFVLR-FB-79-31 ..... N81-23505 #

DFVLR-MITT-79-03 ..... N81-23008 #

DOE/BC-10045/12 ..... N81-23316 #

DOE/CS-0026/13 ..... N81-23979 #
DOE/CS-31037/T1 ..... N81-23693 #
DOE/CS-34127/1 ..... N81-23630 #
DOE/CS-54209/1 ..... N81-23602*#

DOE/DP-40069/3 ..... N81-23454 #

DOE/EA-0134 ..... N81-23721 #

DOE/EIA-0202/4-VOL-2 ..... N81-23654 #
DOE/EIA-0205(80-4Q) ..... N81-23952 #
DOE/EIA-0229 ..... N81-23951 #

DOE/ER-0053 ..... N81-23594*#
DOE/ER-00946/T1 ..... N81-23877 #
DOE/ER-02462/T1 ..... N81-23261 #
DOE/ER-02872/5 ..... N81-23258 #
DOE/ER-02899/T2 ..... N81-23933 #
DOE/ER-02923/4 ..... N81-23295 #
DOE/ER-03077/170 ..... N81-23041 #
DOE/ER-04452/3 ..... N81-23788 #
DOE/ER-04991/2 ..... N81-23229 #
DOE/ER-05002/15 ..... N81-23931 #
DOE/ER-05223/31 ..... N81-23874 #
DOE/ER-10029/T1 ..... N81-23216 #
DOE/ER-10107/1 ..... N81-23914 #
DOE/ER-10382/2 ..... N81-23296 #
DOE/ER-10439/2 ..... N81-23226 #
DOE/ER-10450/1 ..... N81-23294 #
DOE/ER-10466/T2 ..... N81-23460 #
DOE/ER-10466/T3 ..... N81-23468 #
DOE/ER-10632/1 ..... N81-23213 #
DOE/ER-10635/T1 ..... N81-23911 #
DOE/ER-10660/1 ..... N81-23225 #

DOE/ET-10296/70 ..... N81-23310 #
DOE/ET-10463/T1-VOL-1 ..... N81-23716 #
DOE/ET-10520/1 ..... N81-23314 #
DOE/ET-12138/T1-VOL-1 ..... N81-23318 #
DOE/ET-15611/3 ..... N81-23902 #
DOE/ET-20055/T1 ..... N81-23662 #
DOE/ET-20055/T2-VOL-1 ..... N81-23663 #
DOE/ET-20055/T2-VOL-2 ..... N81-23664 #
DOE/ET-20055/T2-VOL-3-BK-1 ..... N81-23665 #
DOE/ET-20055/T2-VOL-3-BK-2 ..... N81-23666 #
DOE/ET-20055/T2-VOL-4 ..... N81-23667 #
DOE/ET-20055/T3-EXEC-SUMM ..... N81-23596 #
DOE/ET-20055/T4-EXEC-SUMM ..... N81-23668 #
DOE/ET-20055/T5 ..... N81-23679 #
DOE/ET-20279/112 ..... N81-23650 #
DOE/ET-20356/2 ..... N81-23601*#
DOE/ET-27081/2 ..... N81-23570 #
DOE/ET-27225/12 ..... N81-23429 #
DOE/ET-28317/T1 ..... N81-23256 #
DOE/ET-28456/T1 ..... N81-23656 #
DOE/ET-37240/78TR ..... N81-23703 #
DOE/ET-53051/15 ..... N81-23903 #

DOE/EV-0109 ..... N81-23688 #
DOE/EV-00639/22 ..... N81-23728 #
DOE/EV-04361/T2 ..... N81-23869 #
DOE/EV-04477/T2 ..... N81-23677 #
DOE/EV-04703/T1 ..... N81-23875 #
DOE/EV-10038/1 ..... N81-23783 #
DOE/EV-10506/T1 ..... N81-23395 #

DOE/FE-0011 ..... N81-23319 #

DOE/IA-0010/8 ..... N81-23655 #

DOE/ID-12030/12 ..... N81-23568 #
DOE/ID-12047/3 ..... N81-23636 #

DOE/JPL-954331-81/13 ..... N81-23613*#
DOE/JPL-954739-4 ..... N81-23619*#
DOE/JPL-954796-81/12 ..... N81-23622*#
DOE/JPL-955328-80/4 ..... N81-23615*#
DOE/JPL-955387-80/3 ..... N81-23612*#
DOE/JPL-955677-81/1 ..... N81-23617*#
DOE/JPL-955699-81/03 ..... N81-23621*#
DOE/JPL-955902-81/1 ..... N81-23616*#

DOE/MC-08196/T1 ..... N81-23257 #

DOE/METC-08089/115 ..... N81-23309 #

DOE/NASA/0163-3 ..... N81-23598*#
DOE/NASA/0201/2 ..... N81-23600*#
DOE/NASA/2593-27 ..... N81-23243*#
DOE/NASA/10769-15 ..... N81-23610*#
DOE/NASA/10769-17 ..... N81-23611*#
DOE/NASA/51040-23 ..... N81-23609*#
DOE/NASA/51044-16 ..... N81-23608*#

DOE/NE-0030/4(80) ..... N81-23700 #

DOE/PC-30075/4 ..... N81-23317 #
DOE/PC-30217/T1 ..... N81-23320 #
DOE/PC-30293/1 ..... N81-23312 #
DOE/PC-30294/1 ..... N81-23219 #
DOE/PC-30300/T2 ..... N81-23218 #

DOE/PE-70044/T3 ..... N81-23639 #
DOE/PE-70278/T10 ..... N81-23698 #

DOE/RA-29349/01 ..... N81-23643 #
DOE/RA-50108/T1 ..... N81-23631 #

DOE/R5-10148/2 ..... N81-23637 #
DOE/R5-10149/2 ..... N81-23658 #
DOE/R5-10157/2 ..... N81-23976 #

DOE/SERI-8119/3-4 ..... N81-23930 #

DOE/SF-10601/T1 ..... N81-23680 #
DOE/SF-10601/1 ..... N81-23681 #
DOE/SF-10601/2 ..... N81-23682 #
DOE/SF-10802/1 ..... N81-23657 #
DOE/SF-11421/1 ..... N81-23640 #
DOE/SF-12989/1 ..... N81-23968 #

DRD-SE-3 ..... N81-23616*#
DRD-SE-5 ..... N81-23615*#

DREA-TM-80/J ..... N81-23087 #

DREO-R-829 ..... N81-23206 #

DRL-99 ..... N81-23615*#
DRL-156 ..... N81-23616*#

DRSMI/RL-81-2-TR ..... N81-23439 #

DRSTE-RP-702-105 ..... N81-23062 #
DRSTE-RP-702-105 ..... N81-23358 #

D6-48724 ..... N81-23059*#
D31:1980 ..... N81-23330 #
D40:1980 ..... N81-23331 #
D94-10089-2-REV-A ..... N81-23325 #
D180-14853-1 ..... N81-23242*#
D194-10074-2 ..... N81-23937 #
D210-11569-1-VOL-1 ..... N81-23064*#
D210-11569-2-VOL-2 ..... N81-23065*#
D210-11662-1 ..... N81-23070*#

E-495 ..... N81-23486*#
E-710 ..... N81-23275*#
E-720 ..... N81-23462*#
E-730 ..... N81-23188*#
E-744 ..... N81-23243*#
E-746 ..... N81-23608*#
E-748 ..... N81-23245*#
E-767 ..... N81-23205*#
E-786 ..... N81-23435*#
E-793 ..... N81-23244*#
E-795 ..... N81-23417*#
E-796 ..... N81-23418*#
E-814 ..... N81-23609*#
E-819 ..... N81-23610*#
E-825 ..... N81-23490*#
E-842 ..... N81-23627*#
E-847 ..... N81-23085*#
E-849 ..... N81-23611*#
E-852 ..... N81-23625*#
E-856 ..... N81-23626*#

EGG-FM-5314 ..... N81-23865 #

EGG-PG-G-80-041 ..... N81-23644 #

EGG-TRANS-5291 ..... N81-23977 #

EMD-79-30 ..... N81-23974 #
EMD-80-72 ..... N81-23552 #

EOARD-TR-81-2 ..... N81-23247 #

EPA-430/9-80-007 ..... N81-23738 #
EPA-450/4-80-001 ..... N81-23730 #
EPA-460/3-80-027 ..... N81-23474 #
EPA-560/12-80-001A ..... N81-23735 #
EPA-560/12-80-001C ..... N81-23736 #
EPA-560/13-80-21 ..... N81-23729 #
EPA-560/13-80-026 ..... N81-23731 #
EPA-600/2-80-007B-VOL-2 ..... N81-23324 #
EPA-600/2-80-096 ..... N81-23982 #
EPA-600/4-80-053 ..... N81-23733 #
EPA-600/9-80-039C-VOL-3 ..... N81-23734 #

EPA/MCD-68 ..... N81-23738 #

EPRI-AP-1610 ..... N81-23704 #
EPRI-AP-1641 ..... N81-23645 #
EPRI-AP-1666 ..... N81-23215 #
EPRI-AP-1681-SU ..... N81-23471 #
EPRI-AP-1681-VOL-2 ..... N81-23472 #
EPRI-AP-1712 ..... N81-23307 #
EPRI-AP-1713-SR ..... N81-23633 #

EPRI-CS-1665-PT-1 ..... N81-23427 #
EPRI-CS-1665-PT-2 ..... N81-23427 #

EPRI-EA-673-VOL-1 ..... N81-23571 #
EPRI-EA-673-VOL-2-PT-1 ..... N81-23572 #

EPRI-EL-80-8-LD ..... N81-23396 #

EPRI-EM-1481 ..... N81-23651 #
EPRI-EM-1670 ..... N81-23694 #
EPRI-EM-1697 ..... N81-23696 #
EPRI-EM-1716 ..... N81-23978 #

EPRI-NP-1658 ..... N81-23876 #
EPRI-NP-1687-PT-1 ..... N81-23469 #
EPRI-NP-1689-SR ..... N81-23397 #
EPRI-NP-1703 ..... N81-23252 #

ERADCOM/ASL-CR-81-0100-1 ..... N81-23564 #
ERADCOM/ASL-CR-81-0100-2 ..... N81-23767 #

ERADCOM/ASL-TR-0075 ..... N81-23772 #
ERADCOM/ASL-TR-0076 ..... N81-23440 #
ERADCOM/ASL-TR-0078 ..... N81-23771 #

ERIM-134200-10-F ..... N81-23436 #
ERIM-142600-1-F ..... N81-23565 #
ERIM-145400-7-P ..... N81-23894 #

ESA-SP-1027 ..... N81-23759

ESA-TT-532 ..... N81-23008 #
ESA-TT-649 ..... N81-23505 #

ESD-TR-81-111-VOL-1 ..... N81-23354 #
ESD-TR-81-111-VOL-2 ..... N81-23355 #
ESD-TR-81-115 ..... N81-23352 #
ESD-TR-81-120 ..... N81-23816 #

ESG-80-38 ..... N81-23640 #

ESL-712527-4 ..... N81-23353 #
ESL-712759-2 ..... N81-23740* #

E81-10129 ..... N81-23542* #
E81-10130 ..... N81-23543* #
E81-10131 ..... N81-23544* #
E81-10136 ..... N81-23545* #
E81-10137 ..... N81-23546* #
E81-10138 ..... N81-23547* #
E81-10139 ..... N81-23548* #
E81-10140 ..... N81-23549* #
E81-10141 ..... N81-23550* #
E81-10142 ..... N81-23551* #

FAA-AAS-80-1 ..... N81-23097 #

FAA-CT-80-6-2-VOL-2 ..... N81-23769 #
FAA-CT-80-29 ..... N81-23768 #
FAA-CT-80-43 ..... N81-23060 #
FAA-CT-81-5 ..... N81-23061 #

FAA-MS-81-1 ..... N81-23081 #

FAA-RD-80-2 ..... N81-23063 #
FAA-RD-80-63-2-VOL-2 ..... N81-23769 #
FAA-RD-81-1 ..... N81-23768 #

FDA-81-03 ..... N81-23038* #

FE-1231-21-VOL-3 ..... N81-23575 #
FE-1231-24-VOL-6 ..... N81-23569 #
FE-1231-25 ..... N81-23576 #
FE-1231-27-VOL-9 ..... N81-23574 #
FE-1545-86 ..... N81-23308 #
FE-1784-69 ..... N81-23253 #
FE-1806-92 ..... N81-23473 #
FE-2315-58 ..... N81-23311 #
FE-2621-15 ..... N81-23254 #
FE-2806-7 ..... N81-23315 #

FHWA/AR-80/004 ..... N81-23334 #

FHWA/CA/TL-80/13 ..... N81-23326 #

FHWA/RD-80/025 ..... N81-23333 #

FJSRL-TR-80-0020 ..... N81-23794 #

FR-5 ..... N81-23919 #
FR-80-10065 ..... N81-23382 #
FR-60023 ..... N81-23401 #

GA-A-15683 ..... N81-23638 #
GA-A-16016 ..... N81-23866 #
GA-A-16178 ..... N81-23901 #

GAC-RE-604 ..... N81-23676 #

GAO/MASAD-81-20 ..... N81-23074 #

GEOFLO/8 ..... N81-23429 #

GLERL-CONTRIB-232 ..... N81-23780 #

GRI-79/0075 ..... N81-23321 #
GRI-80/0014 ..... N81-23707 #

H-C1011/002-80-948F ..... N81-23639 #

H-REPT-97-32 ..... N81-23971 #

H-REPT-97-32 ..... N81-23972 #

HDL-TR-1921 ..... N81-23892 #

HONEYWELL-81SRC19 ..... N81-23890 #

IERL-RTP-1063-VOL-3 ..... N81-23734 #

IKE-5-196 ..... N81-23649 #

IR-1 ..... N81-23387 #
IR-1 ..... N81-23547* #
IR-2 ..... N81-23548* #

IS-T-916 ..... N81-23221 #
IS-T-920 ..... N81-23724 #
IS-T-922 ..... N81-23873 #
IS-T-935 ..... N81-23398 #
IS-T-936 ..... N81-23871 #
IS-T-942 ..... N81-23259 #
IS-T-947 ..... N81-23723 #
IS-T-950 ..... N81-23313 #

ISBN-91-540-3315-2 ..... N81-23330 #
ISBN-91-540-3367-5 ..... N81-23331 #
ISBN-92-835-0281-7 ..... N81-23044 #
ISBN-92-835-0284-1 ..... N81-23507 #
ISBN-92-835-0285-X ..... N81-23955 #
ISBN-92-835-1380-0 ..... N81-23431 #

ISSN-0077-5606 ..... N81-23412 #
ISSN-0340-7608 ..... N81-23969 #
ISSN-0379-6566 ..... N81-23759

ISU-ERI-AMES-81121 ..... N81-23090 #

ITT-81-02-01 ..... N81-23891 #

JHU/APL-CP-079 ..... N81-23446 #
JHU/APL-CP-081 ..... N81-23988 #

JPL-PUB-80-83 ..... N81-23975* #
JPL-PUB-80-84 ..... N81-23344* #
JPL-PUB-80-94 ..... N81-23602* #
JPL-PUB-81-6 ..... N81-23563* #
JPL-PUB-81-7 ..... N81-23814* #
JPL-PUB-81-21 ..... N81-23300* #
JPL-PUB-81-22 ..... N81-23603* #
JPL-PUB-81-26 ..... N81-23562* #
JPL-PUB-81-32 ..... N81-23601* #

JPL-TDA-PR-42-62 ..... N81-23997* #

JPL-9950-526 ..... N81-23612* #
JPL-9950-527 ..... N81-23616* #
JPL-9950-528 ..... N81-23615* #
JPL-9950-529 ..... N81-23614* #
JPL-9950-530 ..... N81-23613* #
JPL-9950-533 ..... N81-23621* #
JPL-9950-534 ..... N81-23622* #
JPL-9950-535 ..... N81-23619* #
JPL-9950-537 ..... N81-23620* #
JPL-9950-538 ..... N81-23617* #
JPL-9950-540 ..... N81-23618* #

JSC-16755 ..... N81-23182* #
JSC-17061 ..... N81-23812* #

KU-FRL-333-1 ..... N81-23174* #
KU-FRL-406-2 ..... N81-23040* #

L-13609 ..... N81-23096* #
L-13855 ..... N81-23742* #
L-13959 ..... N81-23410* #
L-14229 ..... N81-23791* #
L-14245 ..... N81-23761* #
L-14380 ..... N81-23432* #

LA-UR-80-2969 ..... N81-23442 #
LA-UR-80-3502 ..... N81-23823 #
LA-UR-81-26 ..... N81-23701 #
LA-UR-81-82 ..... N81-23935 #
LA-UR-81-145 ..... N81-23898 #
LA-UR-81-192 ..... N81-23173 #
LA-UR-81-270 ..... N81-23836 #
LA-UR-81-284 ..... N81-23953 #
LA-UR-81-301 ..... N81-23883 #
LA-UR-81-325 ..... N81-23917 #

LA-7941-MS ..... N81-23904 #

LA-8161-M ..... N81-23921 #
LA-8370-MS ..... N81-23934 #
LA-8662-T ..... N81-23872 #
LA-8722-MS ..... N81-23685 #
LA-8749-PR ..... N81-23189 #

LBL-8789 ..... N81-23726 #
LBL-11037 ..... N81-23790 #
LBL-11690 ..... N81-23230 #
LBL-11789 ..... N81-23695 #
LBL-11844 ..... N81-23870 #
LBL-12023 ..... N81-23255 #
LBL-12205 ..... N81-23910 #
LBL-12213 ..... N81-23455 #
LBL-12327 ..... N81-23784 #
LBL-12359 ..... N81-23220 #
LBL-12360 ..... N81-23223 #
LBL-12361 ..... N81-23222 #

LC-79-607790 ..... N81-23266 #
LC-80-600182 ..... N81-23445 #
LC-80-600188 ..... N81-23335 #

LCD-80-89 ..... N81-23079 #

LEMSCO-15991 ..... N81-23812* #

LG78ER0252 ..... N81-23028* #

LIDS-P-1082 ..... N81-23835 #

LIDS-R-1039 ..... N81-23859 #

LIDS-TH-1090 ..... N81-23829* #

LMF-81 ..... N81-23719 #
LMF-83 ..... N81-23718 #

LMSC-HREC-TR-D784111 ..... N81-23187* #

M-340-VOL-7 ..... N81-23595* #
M-346 ..... N81-23760* #

MA-RD-940-80092 ..... N81-23430 #

MAE-1525 ..... N81-23415* #

MASGP-79-020 ..... N81-23785 #

MDC-J4665 ..... N81-23058* #

MIMEO-SER-1331 ..... N81-23827 #

MIMEOGRAPH-SER-81-5 ..... N81-23843 #

MIT-TR-210 ..... N81-23042 #

MITNRL-006 ..... N81-23914 #

MM-3724-81-5 ..... N81-23195 #

MOR-M-989-81-01 ..... N81-23180* #

MOR-O-490-603-81-01 ..... N81-23177* #
MOR-O-491-203-81-02 ..... N81-23176* #

MOTOROLA-2364/4 ..... N81-23615* #

MP-80-153 ..... N81-23867* #

MRI-179-9 ..... N81-23351 #

MRL-R-776 ..... N81-23301 #

MS-EES-TR-81-1 ..... N81-23369 #

MSSU-EIRS-EE-81-1 ..... N81-23810 #
MSSU-EIRS-EE-81-3 ..... N81-23453 #

MTR-8102-VOL-1 ..... N81-23354 #
MTR-8102-VOL-2 ..... N81-23355 #
MTR-8122 ..... N81-23816 #

N-1472-EPA ..... N81-23736 #

NADC-77108-30 ..... N81-23075 #
NADC-80205-60 ..... N81-23043 #
NADC-80207-60 ..... N81-23288 #
NADC-81014-60 ..... N81-23289 #

NAE-LR-605 ..... N81-23088 #

NASA-CP-2174 ..... N81-23432* #

NASA-CR-3385 ..... N81-23762* #
NASA-CR-3390 ..... N81-23989* #
NASA-CR-3399 ..... N81-23595* #
NASA-CR-3412 ..... N81-23027* #
NASA-CR-3417 ..... N81-23712* #
NASA-CR-3419 ..... N81-23760* #
NASA-CR-3429 ..... N81-23487* #
NASA-CR-3433 ..... N81-23411* #
NASA-CR-152224 ..... N81-23028* #
NASA-CR-152336-1 ..... N81-23064* #
NASA-CR-152336-2 ..... N81-23065* #
NASA-CR-152343 ..... N81-23026* #
NASA-CR-152391-VOL-1 ..... N81-23030* #
NASA-CR-152391-VOL-2 ..... N81-23031* #
NASA-CR-152391-VOL-3 ..... N81-23032* #
NASA-CR-152391-VOL-4 ..... N81-23033* #
NASA-CR-152405 ..... N81-23080* #
NASA-CR-152408 ..... N81-23058* #
NASA-CR-159358 ..... N81-23477* #
NASA-CR-160940 ..... N81-23812* #
NASA-CR-160945 ..... N81-23242* #
NASA-CR-160946 ..... N81-23561* #
NASA-CR-160952 ..... N81-23800* #
NASA-CR-161679 ..... N81-23597* #
NASA-CR-161722 ..... N81-23605* #
NASA-CR-161725 ..... N81-23607* #
NASA-CR-161731 ..... N81-23606* #
NASA-CR-161746 ..... N81-23924* #
NASA-CR-161748 ..... N81-23186* #
NASA-CR-161750 ..... N81-23599* #
NASA-CR-161752 ..... N81-23100* #
NASA-CR-161754 ..... N81-23763* #
NASA-CR-161755 ..... N81-23925* #
NASA-CR-161757 ..... N81-23187* #
NASA-CR-161759 ..... N81-23185* #
NASA-CR-161760 ..... N81-23184* #
NASA-CR-163107 ..... N81-23040* #
NASA-CR-164119 ..... N81-23542* #
NASA-CR-164120 ..... N81-23543* #
NASA-CR-164121 ..... N81-23544* #
NASA-CR-164139 ..... N81-23545* #
NASA-CR-164145 ..... N81-23546* #
NASA-CR-164146 ..... N81-23547* #
NASA-CR-164147 ..... N81-23548* #
NASA-CR-164148 ..... N81-23551* #
NASA-CR-164215 ..... N81-23594* #
NASA-CR-164229 ..... N81-23489* #
NASA-CR-164272 ..... N81-23506* #
NASA-CR-164273 ..... N81-23461* #
NASA-CR-164277 ..... N81-23814* #
NASA-CR-164278 ..... N81-23603* #
NASA-CR-164279 ..... N81-23562* #
NASA-CR-164280 ..... N81-23975* #
NASA-CR-164281 ..... N81-23300* #
NASA-CR-164282 ..... N81-23563* #
NASA-CR-164283 ..... N81-23602* #
NASA-CR-164284 ..... N81-23601* #
NASA-CR-164285 ..... N81-23344* #
NASA-CR-164286 ..... N81-23889* #
NASA-CR-164287 ..... N81-23413* #
NASA-CR-164288 ..... N81-23997* #
NASA-CR-164290 ..... N81-23993* #
NASA-CR-164291 ..... N81-23863* #
NASA-CR-164292 ..... N81-23415* #
NASA-CR-164293 ..... N81-23433* #
NASA-CR-164294 ..... N81-23038* #
NASA-CR-164295 ..... N81-23095* #
NASA-CR-164296 ..... N81-23765* #
NASA-CR-164297 ..... N81-23193* #
NASA-CR-164298 ..... N81-23174* #
NASA-CR-164315 ..... N81-23766* #
NASA-CR-164316 ..... N81-23623* #
NASA-CR-164317 ..... N81-23926* #
NASA-CR-164318 ..... N81-23624* #
NASA-CR-164319 ..... N81-23829* #
NASA-CR-164320 ..... N81-23617* #
NASA-CR-164321 ..... N81-23093* #
NASA-CR-164322 ..... N81-23612* #
NASA-CR-164323 ..... N81-23621* #
NASA-CR-164324 ..... N81-23618* #
NASA-CR-164325 ..... N81-23616* #
NASA-CR-164327 ..... N81-23615* #
NASA-CR-164328 ..... N81-23619* #
NASA-CR-164329 ..... N81-23991* #
NASA-CR-164330 ..... N81-23416* #
NASA-CR-164331 ..... N81-23613* #
NASA-CR-164332 ..... N81-23814* #
NASA-CR-164333 ..... N81-23620* #
NASA-CR-164334 ..... N81-23492* #
NASA-CR-164335 ..... N81-23868* #
NASA-CR-164336 ..... N81-23741* #
NASA-CR-164337 ..... N81-23764* #
NASA-CR-164338 ..... N81-23740* #
NASA-CR-164339 ..... N81-23739* #
NASA-CR-164340 ..... N81-23867* #
NASA-CR-165129 ..... N81-23598* #
NASA-CR-165231 ..... N81-23345* #
NASA-CR-165232 ..... N81-23346* #
NASA-CR-165297 ..... N81-23086* #
NASA-CR-165301 ..... N81-23347* #
NASA-CR-165303 ..... N81-23600* #
NASA-CR-165336 ..... N81-23069* #
NASA-CR-165344 ..... N81-23070* #
NASA-CR-165347 ..... N81-23491* #
NASA-CR-165623-VOL-1 ..... N81-23554* #
NASA-CR-165623-VOL-2 ..... N81-23555* #
NASA-CR-165623-VOL-3 ..... N81-23556* #
NASA-CR-165623-VOL-4 ..... N81-23557* #
NASA-CR-165623-VOL-5 ..... N81-23558* #
NASA-CR-165623-VOL-6 ..... N81-23559* #
NASA-CR-165623-VOL-7 ..... N81-23560* #
NASA-CR-165679 ..... N81-23035* #
NASA-CR-165681 ..... N81-23192* #
NASA-CR-165690 ..... N81-23414* #
NASA-CR-165696 ..... N81-23181* #
NASA-CR-165700 ..... N81-23059* #
NASA-CR-165706 ..... N81-23034* #
NASA-CR-166150 ..... N81-23029* #
NASA-CR-166173 ..... N81-23068* #
NASA-CR-166175 ..... N81-23488* #
NASA-CR-166176 ..... N81-23343* #
NASA-CR-166177 ..... N81-23861* #
NASA-CR-166178 ..... N81-23553* #

NASA-EP-169 ..... N81-23179* #

NASA-RP-1062 ..... N81-23742* #

NASA-SP-7500(15) N81-23936*

NASA-TM-73289 ..... N81-23996* #
NASA-TM-78517 ..... N81-23798* #
NASA-TM-78536 ..... N81-23799* #
NASA-TM-80198 ..... N81-23713* #
NASA-TM-81267 ..... N81-23434* #
NASA-TM-81285 ..... N81-23039* #
NASA-TM-81287 ..... N81-23813* #
NASA-TM-81294 ..... N81-23037* #
NASA-TM-81358 ..... N81-23066* #
NASA-TM-81359 ..... N81-23067* #
NASA-TM-81592 ..... N81-23435* #
NASA-TM-81704 ..... N81-23188* #
NASA-TM-81713 ..... N81-23608* #
NASA-TM-81715 ..... N81-23245* #
NASA-TM-81740 ..... N81-23244* #
NASA-TM-81742 ..... N81-23417* #
NASA-TM-81743 ..... N81-23418* #
NASA-TM-81748 ..... N81-23609* #
NASA-TM-81752 ..... N81-23243* #
NASA-TM-81756 ..... N81-23610* #
NASA-TM-81762 ..... N81-23490* #
NASA-TM-81765 ..... N81-23275* #
NASA-TM-81927 ..... N81-23036* #
NASA-TM-81947 ..... N81-23096* #
NASA-TM-81961 ..... N81-23072* #
NASA-TM-81962 ..... N81-23071* #
NASA-TM-81968 ..... N81-23862* #
NASA-TM-82048 ..... N81-23448* #
NASA-TM-82083 ..... N81-23986* #
NASA-TM-82131 ..... N81-23900* #
NASA-TM-82136 ..... N81-23990* #
NASA-TM-82137 ..... N81-23987* #
NASA-TM-82139 ..... N81-23175* #
NASA-TM-82283 ..... N81-23743* #
NASA-TM-82284 ..... N81-23984* #
NASA-TM-82285 ..... N81-23985* #
NASA-TM-82327 ..... N81-23549* #
NASA-TM-82328 ..... N81-23550* #
NASA-TM-82348 ..... N81-23180* #
NASA-TM-82349 ..... N81-23176* #
NASA-TM-82350 ..... N81-23177* #
NASA-TM-82351 ..... N81-23992* #
NASA-TM-82415 ..... N81-23604* #
NASA-TM-82589 ..... N81-23462* #
NASA-TM-82597 ..... N81-23627* #
NASA-TM-82600 ..... N81-23085* #
NASA-TM-82604 ..... N81-23625* #
NASA-TM-82609 ..... N81-23611* #
NASA-TM-82610 ..... N81-23626* #
NASA-TM-82619 ..... N81-23205* #
NASA-TM-83106 ..... N81-23099* #

NASA-TP-1809 ..... N81-23486* #
NASA-TP-1845 ..... N81-23410* #
NASA-TP-1846 ..... N81-23791* #
NASA-TP-1847 ..... N81-23761* #
NASA-TP-1859 ..... N81-23838* #
NASA-TP-1860 ..... N81-23182* #

NAVOCEANCOMC/JTWC-TN-80-3 ..... N81-23775 #

NBS-BSS-130 ..... N81-23335 #

NBS-HB-137 ..... N81-23445 #

NBS-TN-1132 ..... N81-23709 #
NBS-TN-1133 ..... N81-23400 #

NBSIR-80-2100 ..... N81-23332 #
NBSIR-80-2109 ..... N81-23478 #
NBSIR-80-2149 ..... N81-23372 #

NEAR-TR-231 ..... N81-23027* #
NEAR-TR-237 ..... N81-23029* #

NEPRF-TR-80-09 ..... N81-23776 #

NOAA-TM-ERL-ARL-88 ..... N81-23732 #

NOAA-TM-ERL-GLERL-30 ..... N81-23780 #

NOAA-TM-ERL-PMEL-21 ..... N81-23786 #

NOAA-TM-ERL-WPL-63 ..... N81-23781 #

NOAA-80110702-PT-1 ..... N81-23995 #
NOAA-80110703-PT-2 ..... N81-23994 #
NOAA-80110704 ..... N81-23732 #
NOAA-80110705 ..... N81-23786 #
NOAA-80110706 ..... N81-23781 #
NOAA-80111002 ..... N81-23780 #
NOAA-80111405 ..... N81-23578 #
NOAA-80120306 ..... N81-23785 #

NOO-RP-31 ..... N81-23947 #

NOR-81-79 ..... N81-23192* #

NOSC/TR-565 ..... N81-23897 #

NPS61-81-002 ..... N81-23752 #
NPS62-80-013 ..... N81-23360 #
NPS62-80-014 ..... N81-23363 #
NPS62-80-015 ..... N81-23362 #
NPS67-81-002 ..... N81-23715 #

NRC-19164 ..... N81-23088 #

NRL-MR-4411 ..... N81-23280 #
NRL-MR-4412 ..... N81-23787 #
NRL-MR-4475 ..... N81-23359 #
NRL-MR-4476 ..... N81-23751 #
NRL-MR-4481 ..... N81-23466 #
NRL-MR-4489 ..... N81-23304 #
NRL-MR-4492 ..... N81-23384 #
NRL-MR-4495 ..... N81-23248 #

NRL-79-0341-1 ..... N81-23891 #

NR81H-2 ..... N81-23075 #

NSF/RA-800212 ..... N81-23329 #
NSF/RA-800309 ..... N81-23401 #
NSF/RA-800333 ..... N81-23859 #

NSSDC/WDC-A-R/S-80-09 ..... N81-23743* #
NSSDC/WDC-A-R/S-80-12 ..... N81-23984* #
NSSDC/WDC-A-R/S-81-03-VOL-2 ..... N81-23985* #

NSWC/TR-79-281 ..... N81-23305 #

NUSC-TR-6343 ..... N81-23426 #

NVO-196-20 ..... N81-23881 #

NWC-TP-6193 ..... N81-23302 #

NYSERDA-80-3-1 ..... N81-23092 #
NYSERDA-80-3-2 ..... N81-23091 #
NYSERDA-80-12 ..... N81-23470 #
NYSERDA-80-17 ..... N81-23708 #
NYSERDA-80-22 ..... N81-23322 #

N115 ..... N81-23853 #
N117 ..... N81-23852 #
N119 ..... N81-23851 #
N120 ..... N81-23856 #
N121 ..... N81-23855 #
N122 ..... N81-23966 #
N124 ..... N81-23970 #
N125 ..... N81-23967 #
N126 ..... N81-23854 #

ONR-TR-5 ..... N81-23285 #
ONR-TR-7 ..... N81-23290 #

ONRL-C-7-80 ..... N81-23494 #

ORAU/IEA-81-2(M) ..... N81-23642 #

ORC-81-2 ..... N81-23832 #

ORNL/CON-68 ..... N81-23686 #

ORNL/EIS-176 ..... N81-23727 #

ORNL/TM-7120 ..... N81-23906 #
ORNL/TM-7123 ..... N81-23443 #
ORNL/TM-7486 ..... N81-23905 #
ORNL/TM-7620 ..... N81-23720 #
ORNL/TM-7631 ..... N81-23884 #
ORNL/TM-7691 ..... N81-23899 #

ORO-1473-T1-VOL-2-1 ..... N81-23392 #

OWRT-A-023-ARK(3) ..... N81-23586 #
OWRT-A-089-NY(1) ..... N81-23588 #
OWRT-A-113-MO(1) ..... N81-23584 #

PAM-28 ..... N81-23834 #
PAM-32 ..... N81-23828 #

PAR-80-58 ..... N81-23948 #

PB81-130064 ..... N81-23328 #
PB81-132698 ..... N81-23329 #
PB81-133555 ..... N81-23988 #
PB81-133621 ..... N81-23446 #
PB81-134918 ..... N81-23585 #
PB81-135006 ..... N81-23266 #
PB81-135014 ..... N81-23581 #
PB81-135022 ..... N81-23264 #
PB81-135030 ..... N81-23323 #
PB81-135204 ..... N81-23430 #
PB81-135444 ..... N81-23577 #
PB81-135725 ..... N81-23330 #
PB81-135733 ..... N81-23331 #
PB81-137416 ..... N81-23785 #
PB81-137473 ..... N81-23079 #
PB81-138075 ..... N81-23474 #
PB81-139677 ..... N81-23091 #
PB81-139685 ..... N81-23092 #
PB81-140063 ..... N81-23332 #
PB81-140931 ..... N81-23780 #
PB81-141590 ..... N81-23324 #
PB81-144156 ..... N81-23733 #
PB81-144180 ..... N81-23078 #
PB81-144370 ..... N81-23372 #
PB81-144438 ..... N81-23322 #
PB81-144446 ..... N81-23982 #
PB81-144669 ..... N81-23983 #
PB81-144800 ..... N81-23734 #
PB81-144818 ..... N81-23580 #
PB81-144842 ..... N81-23579 #
PB81-145047 ..... N81-23586 #
PB81-145153 ..... N81-23583 #
PB81-145278 ..... N81-23995 #
PB81-145286 ..... N81-23994 #
PB81-145369 ..... N81-23781 #
PB81-145377 ..... N81-23804 #
PB81-145757 ..... N81-23478 #
PB81-145781 ..... N81-23400 #
PB81-145831 ..... N81-23758 #
PB81-145864 ..... N81-23333 #
PB81-145930 ..... N81-23708 #
PB81-145971 ..... N81-23747 #
PB81-146698 ..... N81-23735 #
PB81-146706 ..... N81-23736 #
PB81-146722 ..... N81-23729 #
PB81-146862 ..... N81-23859 #
PB81-146995 ..... N81-23730 #
PB81-147001 ..... N81-23731 #
PB81-147134 ..... N81-23271 #
PB81-147274 ..... N81-23475 #
PB81-147290 ..... N81-23709 #
PB81-147332 ..... N81-23445 #
PB81-147365 ..... N81-23335 #
PB81-147381 ..... N81-23232 #
PB81-148181 ..... N81-23590 #
PB81-148199 ..... N81-23591 #
PB81-148215 ..... N81-23265 #
PB81-148223 ..... N81-23270 #
PB81-148231 ..... N81-23234 #
PB81-148249 ..... N81-23263 #
PB81-148264 ..... N81-23592 #
PB81-148272 ..... N81-23299 #
PB81-148496 ..... N81-23786 #
PB81-148579 ..... N81-23401 #
PB81-148918 ..... N81-23593 #
PB81-149072 ..... N81-23732 #
PB81-149528 ..... N81-23231 #
PB81-149643 ..... N81-23584 #
PB81-149783 ..... N81-23578 #
PB81-150021 ..... N81-23269 #
PB81-150047 ..... N81-23233 #
PB81-150096 ..... N81-23476 #
PB81-150146 ..... N81-23582 #
PB81-150153 ..... N81-23268 #
PB81-150161 ..... N81-23267 #
PB81-150914 ..... N81-23737 #
PB81-151995 ..... N81-23587 #
PB81-152035 ..... N81-23588 #
PB81-153249 ..... N81-23707 #
PB81-153272 ..... N81-23321 #
PB81-153520 ..... N81-23954 #
PB81-153884 ..... N81-23334 #
PB81-156135 ..... N81-23589 #
PB81-156689 ..... N81-23738 #

PCA-SER-1628 ..... N81-23329 #

PNL-1845-48 ..... N81-23503 #
PNL-3035 ..... N81-23882 #
PNL-3195WERA-9-VOL-9 ..... N81-23634 #
PNL-3302 ..... N81-23428 #
PNL-3527 ..... N81-23725 #

PPPL-1738 ..... N81-23913 #

PR-3712-11 ..... N81-23544* #

PSI-TR-253 ..... N81-23219 #

PUB-70 ..... N81-23586 #

PUBL-1712 ..... N81-23720 #

PWA-5512-75 ..... N81-23086* #

QPR-2 ..... N81-23641 #
QPR-3 ..... N81-23659 #
QPR-3 ..... N81-23890 #

QR-1 ..... N81-23219 #
QR-3 ..... N81-23621* #
QR-21 ..... N81-23613* #

QTPR-1 ..... N81-23310 #
QTPR-2 ..... N81-23468 #
QTPR-3 ..... N81-23460 #

R-SAL-03/81-02 ..... N81-23181* #

R-12-80 ..... N81-23231 #
R-1404 ..... N81-23183 #
R-1614 ..... N81-23487* #
R-2575-EPA ..... N81-23735 #

RADC-TR-80-366 ..... N81-23948 #
RADC-TR-80-367 ..... N81-23351 #
RADC-TR-80-368 ..... N81-23391 #
RADC-TR-80-377 ..... N81-23183 #
RADC-TR-80-388 ..... N81-23895 #
RADC-TR-80-400 ..... N81-23567 #
RADC-TR-80-408 ..... N81-23357 #
RADC-TR-81-4 ..... N81-23386 #
RADC-TR-81-6 ..... N81-23368 #
RADC-TR-81-7 ..... N81-23367 #
RADC-TR-81-47 ..... N81-23896 #

RAG-163 ..... N81-23370 #

RE-618 ..... N81-23419 #

REPT-81-SM-5 ..... N81-23463 #
REPT-81-016 ..... N81-23178 #
REPT-040-210 ..... N81-23247 #
REPT-120 ..... N81-23748 #
REPT-121 ..... N81-23497 #
REPT-122 ..... N81-23496 #
REPT-176 ..... N81-23550* #
REPT-179 ..... N81-23549* #
REPT-260 ..... N81-23760* #
REPT-2214-21-TR-2409 ..... N81-23938 #
REPT-2214-22-TR-2410 ..... N81-23939 #
REPT-8103-01 ..... N81-23925* #
REPT-33452-M-3 ..... N81-23184* #
REPT-33452-M-4 ..... N81-23185* #
REPT-33452F ..... N81-23186* #

RHO-BWI-SA-42 ..... N81-23880 #

RP-291 ..... N81-23596 #

RR-80-2 ..... N81-23858 #

RRC-80-8 ..... N81-23567 #

R80-142 ..... N81-23380 #

S-REPT-97-100 ..... N81-23973 #

S-504 ..... N81-23838* #
S-506 ..... N81-23182* #

S/IS-8004 ..... N81-23831 #
S/IS-8005-PT-1 ..... N81-23824 #

SA-ALC-MM-006861 ..... N81-23938 #
SA-ALC-MM-006862 ..... N81-23939 #

SAI-80-022-CP ..... N81-23411* #
SAI-82-451-WA ..... N81-23617* #

SAN-0307-1-VOL-1 ..... N81-23671 #
SAN-0307-1-VOL-2 ..... N81-23672 #
SAN-0307-1-VOL-2-APP ..... N81-23673 #
SAN-0307-1-VOL-3 ..... N81-23674 #

SAND-79-1336 ..... N81-23717 #
SAND-80-1522 ..... N81-23687 #
SAND-80-1869C ..... N81-23702 #
SAND-80-1964/9 ..... N81-23675 #
SAND-80-2192 ..... N81-23297 #
SAND-80-2302 ..... N81-23260 #
SAND-80-2341 ..... N81-23399 #
SAND-80-2378 ..... N81-23705 #
SAND-80-2548 ..... N81-23811 #
SAND-80-2718C ..... N81-23756 #
SAND-80-7061 ..... N81-23678 #
SAND-80-7081 ..... N81-23635 #
SAND-80-7191 ..... N81-23706 #
SAND-81-6005 ..... N81-23909 #
SAND-81-7052 ..... N81-23779 #

SCIENTIFIC-13 ..... N81-23749 #

SC5106.104AR ..... N81-23619* #

SD-81-TR-15 ..... N81-23364 #
SD-81-TR-19 ..... N81-23753 #
SD-81-TR-28 ..... N81-23385 #

SDL-81-2177-05Q ..... N81-23218 #

SERI-9143 ..... N81-23683 #
SERI-9143 ..... N81-23684 #

SERI/PR-8002-7-T1 ..... N81-23214 #
SERI/PR-8032-1-T1 ..... N81-23660 #
SERI/PR-8104-3-T1 ..... N81-23659 #
SERI/PR-9133-1-T1 ..... N81-23641 #

SERI/TP-632-958 ..... N81-23502 #

SERI/TR-632-812 ..... N81-23501 #
SERI/TR-732-604-VOL-1 ..... N81-23393 #

SERI/TR-732-604-VOL-2 ..... N81-23394 #
SERI/TR-751-747 ..... N81-23691 #
SERI/TR-751-748 ..... N81-23690 #
SERI/TR-751-750 ..... N81-23689 #
SERI/TR-8002-8-T1 ..... N81-23676 #
SERI/TR-8081-1-T3 ..... N81-23646 #
SERI/TR-8278-1-T4 ..... N81-23648 #

SERL-75-1 ..... N81-23553* #

SGD-433 ..... N81-23994 #
SGD-433 ..... N81-23995 #

SIE/DIAL-81-002 ..... N81-23566 #

SIO-REF-79-19 ..... N81-23758 #
SIO-REF-80-16 ..... N81-23747 #
SIO-REF-80-20 ..... N81-23749 #

SMU-EE-TR-81-7 ..... N81-23822 #

SOL-81-1 ..... N81-23830 #

SOLAR/0023-81/40 ..... N81-23647 #

SPC-564 ..... N81-23100* #

SR-1 ..... N81-23693 #

SRC-80-TR-64 ..... N81-23464 #

SR8-1-APP ..... N81-23795 #

SSD-80-0108-7-VOL-7 ..... N81-23595* #
SSD-81-0059 ..... N81-23599* #

SSL-81(7951)-1 ..... N81-23741* #

STI-TR-1142-1-1-VOL-1 ..... N81-23825 #
STI-TR-1142-1-2-VOL-2 ..... N81-23826 #

SU-JIAA-TR-28 ..... N81-23488* #
SU-JIAA-TR-29 ..... N81-23343* #
SU-JIAA-TR-31 ..... N81-23861* #

SU-SUIPR-832 ..... N81-23868* #

SU-TR-13 ..... N81-23842 #
SU-TR-164 ..... N81-23842 #

TAMU-FE-4084 ..... N81-23430 #

TCRL-18 ..... N81-23090 #

TELIC-80-3 ..... N81-23661 #

TL-632136 ..... N81-23328 #

TOP-6-3-205 ..... N81-23062 #
TOP-6-3-223 ..... N81-23358 #

TPS79-234 ..... N81-23396 #

TR-1 ..... N81-23194 #
TR-4 ..... N81-23276 #
TR-4 ..... N81-23777 #
TR-4 ..... N81-23833 #
TR-5 ..... N81-23209 #
TR-5 ..... N81-23714 #
TR-6 ..... N81-23927 #
TR-8 ..... N81-23287 #
TR-11 ..... N81-23282 #
TR-11 ..... N81-23789 #
TR-11 ..... N81-23828 #
TR-12 ..... N81-23283 #
TR-12 ..... N81-23834 #
TR-37 ..... N81-23212 #
TR-40 ..... N81-23495 #
TR-43-4-VOL-1 ..... N81-23554* #
TR-43-4-VOL-2 ..... N81-23555* #
TR-43-4-VOL-3 ..... N81-23556* #
TR-43-4-VOL-4 ..... N81-23557* #
TR-43-4-VOL-5 ..... N81-23558* #
TR-43-4-VOL-6 ..... N81-23559* #
TR-43-4-VOL-7 ..... N81-23560* #
TR-48 ..... N81-23840 #
TR-80-4 ..... N81-23850 #
TR-80-30 ..... N81-23817 #
TR-81-1 ..... N81-23792 #
TR-81-2 ..... N81-23839 #
TR-81-03-01 ..... N81-23381 #
TR-97 ..... N81-23817 #
TR-129 ..... N81-23577 #
TR-130 ..... N81-23983 #
TR-145 ..... N81-23390 #
TR-169-SER-2 ..... N81-23745 #
TR-176-SER-2 ..... N81-23847 #
TR-178-SER-2 ..... N81-23746 #
TR-180-SER-2 ..... N81-23844 #
TR-181-SER-2 ..... N81-23846 #
TR-188-SER-2 ..... N81-23845 #
TR-192-SER-2 ..... N81-23848 #
TR-297 ..... N81-23841 #
TR-342 ..... N81-23851 #
TR-348 ..... N81-23854 #
TR-349 ..... N81-23852 #
TR-350 ..... N81-23856 #
TR-353 ..... N81-23855 #
TR-360 ..... N81-23853 #
TR-0081(6930-04)-3 ..... N81-23385 #
TR-0081(6930-06)-1 ..... N81-23364 #
TR-0081(6970-04)-1 ..... N81-23753 #
TR-712759-1 ..... N81-23739* #

TSC-FAA-81-1 ..... N81-23081 #

TSC-PD-B589-1 ..... N81-23895 #

TSR-2 ..... N81-23645 #

TTC-0161 ..... N81-23260 #

UCID-18912 ..... N81-23950 #
UCID-18916 ..... N81-23922 #
UCID-18932 ..... N81-23879 #
UCID-18940 ..... N81-23885 #
UCID-18947 ..... N81-23920 #
UCID-18988 ..... N81-23456 #

UCRL-15314 ..... N81-23919 #
UCRL-15319 ..... N81-23251 #
UCRL-15332 ..... N81-23504 #
UCRL-53051 ..... N81-23371 #
UCRL-53073 ..... N81-23757 #
UCRL-53089 ..... N81-23981 #
UCRL-53092 ..... N81-23980 #
UCRL-53105 ..... N81-23298 #
UCRL-84164 ..... N81-23444 #
UCRL-85330 ..... N81-23837 #

UMICH-HSRI-80-26 ..... N81-23804 #

UMTA-CA-06-0116-80-3 ..... N81-23975* #

USAAVRADCOM-TR-80-D-15 ..... N81-23438 #

USDS-WDR-AK-79-1 ..... N81-23580 #

USGS-WDR-AR-79-1 ..... N81-23579 #

USGS/WRD/HD-80/002 ..... N81-23580 #
USGS/WRD/HD-80/009 ..... N81-23579 #

UTEC-MR-81-031 ..... N81-23766* #

UVA/SE-81-1 ..... N81-23940 #
UVA/SE-81-2 ..... N81-23941 #
UVA/SE-81-3 ..... N81-23849 #

VPI-E-81-3 ..... N81-23193* #

WHOI-81-13 ..... N81-23782 #

WIS-SG-80-236 ..... N81-23578 #

WRRI-91 ..... N81-23585 #

W81-00968 ..... N81-23586 #
W81-00979 ..... N81-23584 #
W81-00981 ..... N81-23983 #
W81-00986 ..... N81-23585 #
W81-01203 ..... N81-23588 #

Y-2201 ..... N81-23190 #
Y-2201 ..... N81-23191 #

Y/DX-244 ..... N81-23697 #

*U.S. GOVERNMENT PRINTING OFFICE: 1981--341-561/4613--1-3

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley

COLORADO
University of Colorado, Boulder

DISTRICT OF COLUMBIA
Library of Congress

GEORGIA
Georgia Institute of Technology, Atlanta

ILLINOIS
The John Crerar Library, Chicago

MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge

MISSOURI
Linda Hall Library, Kansas City

NEW YORK
Columbia University, New York

OKLAHOMA
University of Oklahoma, Bizzell Library

PENNSYLVANIA
Carnegie Library of Pittsburgh

WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library

COLORADO
Denver Public Library

CONNECTICUT
Hartford Public Library

MARYLAND
Enoch Pratt Free Library, Baltimore

MASSACHUSETTS
Boston Public Library

MICHIGAN
Detroit Public Library

MINNESOTA
Minneapolis Public Library and Information Center

NEW JERSEY
Trenton Public Library

NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library

OHIO
Akron Public Library
Cincinnati and Hamilton County Public Library
Cleveland Public Library
Dayton Public Library
Toledo and Lucas County Public Library

TEXAS
Dallas Public Library
Fort Worth Public Library

WASHINGTON
Seattle Public Library

WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESA - Information Retrieval Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

National Aeronautics and
Space Administration

Washington, D.C.
20546

Official Business
Penalty for Private Use $300

SPECIAL FOURTH CLASS MAIL
Book

Postage and Fees Paid
National Aeronautics and
Space Administration
NASA-451

U.S.MAIL

POSTMASTER: If undeliverable (Section 158
Postal Manual) Do Not Return